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THE IRON TRADE REVIEW.

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CLEVELAND, O., DECEMBER 31, 1891.

THE WEEK IN IRON CIRCLES.

General Features. By the time these words shall have reached the eyes of our readers, 1892 with all its possibilities for the iron trade will have been ushered in. Seldom have so many features been combined to make the outlook promising, and that some of them are on the point of realization goes without saying. The situation at the various centers for the last week of the year is well set forth in the following summary from our special reports: A number of large consumers have been in the Cincinnati market during the week, and the aggregate tonnage of sales is very satisfactory. Contracts for Southern mill and mottled grades were placed at extremly low figures, and but few sellers were willing to meet the competition. Some of the principal furnaces, who wanted to dispose of special accumulations, claimed to have closed out those lots and are now firmer on standard grades. It is still a buyers' market if prompt cash is offered for early delivery; but most inquiries are for the first six months of next year. The necessary meeting of interest obligations has made numerous furnace companies especially urgent to hurry forward iron and obtain collections. Now that their wants are supplied for a time it is supposed there will be less pressure to sell, and an increased demand will have its legitimate effect on prices. Consumption is nearly keeping pace with production, and but few consumers are requesting deliveries held up. In Ohio softeners and charcoal foundry irons there is a good business, but the demand for car wheel grades is light, showing that the car makers purchased in advance to cover the contracts since secured by them. The Chicago market is continuing to show a good amount of activity for this season of the year, and the volume of buying has been larger than usual for the month of December. Small orders for both coke and charcoal brands have been numerous, and in addition various deals of larger size have been closed. Coke irons have been most largely in demand, the sales made having been brought about by the low prices which have been ruling, consumers realizing that there is little chance for any further decline, and on the other hand that ruling prices are liable to stiffen somewhat after the first of the year. There is no change in the Lake Superior charcoal market; $17.00, Chicago, continues to be bottom on all the leading brands. Figures reported below this have been made by two or three smaller furnaces having large stocks which they have been forced to move. The situation must end in better figures or a material cutting down of production through the blowing out of stacks. The general outlook continues healthy in all respects, indications point to a good business for the year 1892. That there should be a lull in business at this season of the year is to be expected, but the present one shows less buying at Detroit than usual. Almost every one wants to wait until the beginning of the new year before placing any orders. There is some inquiry for Lake Superior charcoal, and the prospects are good for quite an active buying movement early in the new year. The very large business of the railroads, and at good rates, undoubtedly will give them plenty of money with which to purchase rolling stock and make needed improvements, and all this will help the iron interests. While the year has been one of disappointment to makers of pig iron as regards price, yet the volume has been fully up to the expectations of the majority. The outlook for the coming year is better than last year at this time, although the long expected good times have not yet come. A fair run of business has been recorded during the past week, at Louisville, but prices are weak; shipments on old orders have been going forward with increased promptness, indicating an improvement in car supply, which has heretofore been very far short of requirements. No buying of consequence is looked for until after the holidays. At Buffalo dullness prevails through the trade generally, but some good-sized orders are being placed for early 1892 delivery by those who desire to cover, at present low prices, for work already taken. The outlook for business in the new year is exceedingly good, with increasing inquiry. Prices are firmer in many cases, Southern iron, however, being a trifle weak. St. Louis reports the usual inquiry for carload lots, with a few round lots placed at low figures.

The Local Situation. While nobody in particular was looking for business during holiday week, all the news goes to show that business was on the mend on its own account and the feeling is, in consequence, considerably improved. To what extent this improvement is perceptible in dollars and cents, is somewhat problematical, but that it does exist is quite apparent from the tone of the market. It appears that the improvement hoped for as a result of the recent heavy railway purchases has influenced the market somewhat in advance of the time for which conservative people had set their mark, but as good news in the rarest instances comes too early, the trade in general is much encouraged, and is preparing to benefit from the substantial advance whenever it heaves in sight.

Iron Ore. The vessel men and the ore producers do not seem to have approached anything like an understanding, as yet, in reference to the carrying charges for next year, and, in the absence of these figures, ore men decline to quote their '92 product, even at the mine. Some of the vessel men have made no money the past season, and they lay the blame to themselves for engaging their carrying capacity at a wholly unprofitable figure. They mean to steer clear, next year, of a similar contingency, and it is pretty safe to say that there will be no fifty-five cent ore brought down from Escanaba. On the other hand, it is not unlikely that the coal trade will assume an unwonted degree of attention from the vessel men. The coal trade far outranks the ore trade in tonnage, and as there is no transportation possible for coal but lake freight, it is not beyond the range of probabilities that a pool may be formed to control the forwarding of coal next year at a paying figure. This would, on the other hand, exercise an immediate influence upon the ore trade, so that the matter of ore prices, as based upon that of transportation, is still very much in the dark.

Pig Iron. Pig iron, strange to relate, has advanced fifty cents a ton, and the demand has steadily improved. The return of confidence among buyers has had an almost immediate effect, and is reflected in the firmness of the market. People who, up to date, picked up what iron they needed, from day to day, are not averse, now, to entertaining propositions for round lots of material, so that the increase in the demand is likely to lead to better prices as well. Yet the leading furnacemen are anxious to repress any tendency toward any very sudden or very sharp advance which must inevitably lead, as it has done in the past, to disastrous consequences. In these days of active competition no one looks for large profits, and the sentiment of the entire furnace trade is voiced in the wish for a steady trade, at a fair profit, say, of a dolar a ton.

Merchant Iron. Quite naturally, the products of pig iron are coming in for a share of the betterment, and bar iron is in consequence held firmly at $1.65 at the mills. The demand for bar iron is likely to be active this Spring, and the mills report a fair supply of orders. Steel, too, is on the mend, billets having improved in price up to $25.25. Wire nails, which had been selling as low as $1.55, have advanced, and the entire list of manufactured iron is showing the same signs of improvement. Hardware is quiet, as is customary at this season of the year, and metals are far from being strong.

THE IRON ORE OUTLOOK FOR 1892.

The *Iron Age* takes an intelligent view of the iron ore situation when it says, in a leading editorial article:

At first glance the figures of Lake Superior iron ore shipments from mine ports and stocks at Lake Erie ports, which have been published by the Cleveland *Iron Trade Review*, are not encouraging to the iron ore interests. It is true that the shipments from all ports for the season just closed show a falling off of over 1,500,000 tons on 1890, which would indicate that the trade was under some control, but on the other hand, the iron ore stocks at Lake Erie ports at the close of navigation showed only 400,000 tons less than the immense quantity piled up the corresponding time in the previous year. A stock of 3,500,000 tons of ore looks like a pretty serious weight on that branch of the iron trade. As compared with the statistics of shipments from the mine ports, the stock figures show that about 54 per cent., or a much larger proportion than usual, of the total shipments of the season are on the docks at the receiving ports at the close of navigation.

Concerning a feature of the situation which obviously cannot be put down in actual figures, being largely conjectural (we refer to the probable amount of ore remaining unsold at the close of the season), our New York contemporary says:

As usual, the claim is made that a very small part of this ore is unsold, but we are assured on good authority that the quantity is considerably larger, probably double the amount named. Still it is not such a menace to the trade as it would be if the bulk of ore were unsold. But, nevertheless, the stock is so large that there is nearly a repetition of last year's conditions, notwithstanding the decreased shipments.

The amount estimated by well informed men in the iron ore trade, as remaining unsold on Lake Erie docks, December 1st, was 60,000 tons. Some placed the quantity at as low a figure as 30,000 tons. But even supposing it was 120,000 tons, as conjectured by our contemporary, that would represent less than 3½ per cent. of the total amount on dock, and, being scattered and in odd lots, can have no appreciable effect upon next year's business.

After quoting *The Iron Trade Review's* summary of stocks at lake ports for the past nine years, as showing the significance of this year's figures, the *Iron Age* goes on to say:

Looking, however, from statistics to trade conditions, the situation is seen to have changed greatly from that of a year since. At that time the pig iron manufacturers were just entering a vale of gloom, and the consumers of lake ores among them were perhaps the most dispirited of the whole tribe The Mahoning and Shenango valley furnaces were blowing out or banking, in the hope of compelling the coke operators to reduce the price of coke, and furnaces connected with steel rail mills were being laid off on account of the slack demand for rails. Money was tight, financial troubles in Europe were having a greater effect here than had been anticipated, crops were short, and in general the outlook was bad enough to make all the financial Mark Tapleys rejoice in feeling for once just hopelessly miserable. The situation now is altogether different. While the price of pig iron is undeniably too low for financial comfort, the outlook is in favor of better times in every way. All the conditions are hopeful. The consumption of lake ores during the Winter will be greater than ever before. Unless all signs are utterly and totally misleading, the lower lake docks will be pretty thoroughly cleaned up by the opening of navigation in 1892. The huge stocks on dock now will cut a figure in fixing next year's prices, if the consumption proves to be what is now foreshadowed. As far as can be ascertained, the mine owners will be very conservative the coming year, and will not force a large output on the market, but will be prepared to mine all that may be needed, even if the demand should prove to be in excess of that of the "big year," 1890. But they propose to get a better price than they obtained this year. To this no furnaceman will seriously object if he can at the same time get a better price for his pig iron.

A weekly observation of the iron ore market, repeatedly set forth in these columns, confirms the wisdom of our contemporary's conclusions and leads to the belief that 1892 will be a good one for the iron ore interests, unless all signs fail.

IMPORTANT DISCOVERIES ON THE MESABI IRON RANGE.

Our readers have been advised from time to time regarding the explorations taking place on the Mesabi iron range, in Minnesota, but recent information leads to the belief that, like the Queen of Sheba's estimate of King Solomon's wealth, the half has not been told. From Mr. M. A. Hays, Manager of the Duluth News Bureau, we have received recent data that certainly seem to bear out the seemingly extravagant claims made for this new mining district. That the recent discoveries are "the greatest in the history of the Lake Superior mining regions," may be putting it too strongly, but that they are of the utmost importance must be evident to even the most casual observer. From statements made to our correspondent it appears that at a half dozen locations in township 58, range 16, mines are being developed, and everywhere the story told by the test pits is the same. The Messrs. Merritt, Chases, Grant and others in section 3 have put down thirteen test pits, the deepest showing at least 58 feet of ore, and one forty is practically covered with the ore, while each of the three others have shown the same good indications. This is the Biwabik mine, and from the work done the measurements show at least 9,000,000 tons of ore, and the owners think it will run to a much larger amount, perhaps 20,000,000 tons, though, of course, these at best are estimates. At the Cincinnati mine, just east of the Biwabik, the same rich deposit is said to exist, and also at the Hale property to the east of the Cincinnati. In section 3, west of the Biwabik, the Canton mine, owned by Capt. Sellwood and others, a fine deposit has been shown, and west of that in section 4, John McKinley and others will open the Chicago, where the same great deposit is to be found. Southwest, in sections 8 and 18, the explorations in Williston, Charnley & Co.'s property are showing equal, if not superior quantities of ore. In township 58, range 18, the Mountain Iron Company's mine shows up, so far as the work has been carried on, the same vast amount of ore. Messrs. Hale, Gridley and others have found iron in other localities. Northwest of the Mountain Iron, which is twelve miles directly west of the Biwabik, the Kakina mine is being opened up with excellent prospects. In all the mines where work is now being carried on there is estimated to be from forty to fifty millions tons of ore. The ore found is a soft ore, running from 61 to 65 per cent. pure iron, free from sulphur and silica, making it of the highest Bessemer quality.

The history of the Gogebic "boom" is too fresh in the minds of the investing public to make it probable that there will be a repetition on the new range of the stupendous wild-catting which characterized the opening up of the former; but men's memories are none too long in such matters, and a timely warning to the wise may not be out of place at the present writing.

DECIDEDLY, A MISTAKE.

The Detroit Water-Ways Convention cordially indorsed the contemplated 14-foot canal to join the headwaters of the Ohio with Lake Erie.—[National Labor Tribune.

The bill recently introduced into the United States Senate providing for an appropriation of $10,000 to be expended by the United States engineers in the determination of the feasibility of making a ship-canal connection between the waters of Lake Erie and the upper Ohio river was approved.—[Bradstreet's.

When such standard papers as the *National Labor Tribune* and *Bradstreet's* are led into so serious an error as the above, it is time that correction be made. Not only was the Lake Erie and Ohio River Ship Canal project not "cordially" approved by the Detroit Water-ways Convention, but it was not approved at all. A resolution offered in favor of the scheme was introduced but was quickly referred to the standing committee on legislation as a courteous but convenient method of shelving it. Had the matter come to vote, it would have been overwhelmingly snowed under. This does not necessarily imply that there were no friends of the measure on the floor of the convention, but that it was the set determination of the delegates to hold to the one thing: a twenty-foot channel from Duluth and Superior to the lower lake ports. In this the Pittsburgh canal matter was not alone, for several other like projects were quite as summarily dealt with. Doubtless there were some disappointed gentlemen who carried home pet resolutions of undoubted merit, but the convention did wisely in giving them all the go-by and thus strengthening the main cause for which it met. The side issues can be taken up later on.

Kuhlow's German Trade Review, of Berlin, continues to throw cold water on the idea of German representation at the World's Fair. The McKinley Tariff and the "red tapism of their (our) customs department" are the *bete noir* in the eyes of our Berlin contemporary. Yet, on the same page on which this unjust complaint appears we find the following: "Very many American buyers are present here in our markets. They can be found in every industrial centre, which manufactures fashionable articles These American customers show unmistakable signs of doing a good business with us. The orders which have been so far distributed, are scarcely in any instances smaller than was expected, in fact many of them are very satisfactory." Our contemporary should try to be consistent even if it is prejudiced.

LOCALLY, this is the dullest week of the year in iron and machinery lines, but that is always to be expected for the holiday season. Most of the founders, machinery and engine builders, and boiler and bridge manufacturers, have laid off large numbers of their workmen; but this inactivity can only last a short while, for most of the firms having reduced their working forces have extensive orders booked for next year. Contracts have been let for a great deal of railroad work and for equipments for new establishments and for new parts of old ones. Some of this city's works, even now, are kept running

almost exclusively on the latter class of work, to go to different parts of the United States, to Canada, and to South American countries.

THE official figures of Lake Superior iron ore shipments for 1891, now out, show only one slight change from the figures telegraphed *The Iron Trade Review* three weeks ago. Our estimate of the Escanaba shipments was 3,060,000 tons; the exact figure is 3,052,813 tons.

ISN'T the Pittsburgh *Dispatch* a little "off" in announcing that 1891 was a "big year for railroads"? According to the figures just out, the total new mileage for the year was 4,168. Our impression is that 1891 was a pretty dull year in the matter of railroad building.

SHOULD the Pennsylvania tin plate manufacturers adopt the suggestion of furnishing the roofing plate necessary to cover the buildings of the Pennsylvania exhibit at the World's Fair, an object lesson would be presented at once interesting and instructive.

To all our readers, A Happy and Successful New Year.

POINTS IN THE BUSINESS SITUATION.

Cotton-Tie Importations.

There was no importation of cotton-ties this year, against 15,076 tons in the first ten months of 1890. Good enough; there is nothing like a clean sweep.—[National Labor Tribune.

Bessemer Pig Taking an Upward Slant.

During the past week conditions at the Bessemer end of the iron trade took a kind of upward slant; no actual improvement is visible, however, but it is becoming apparent that confidence—that trade is still a living issue and an improvable factor—is re-asserting itself. Prices strengthened about twenty-five cents worth, and it can be said with truth, that, while a rise of twenty-five cents is no great thing in boom times, there are periods, nevertheless, when a quarter of a dollar looked as big as a fly-wheel on a 200 horse power engine. This is not exactly that kind of a period, because conditions are by no means of a pinching character, and, unless the rise of twenty-five cents means that prices have actually and determinedly started on the up grade, there is not enough of it to generate enthusiasm.—["Cold Short" in Ohio Valley Manufacturer, Wheeling.

Locomotive-Building in 1891.

From the returns of locomotive building by the private shops, that is all other than railroad shops, that we have received up to this date, the output is less than it was last year. We can compare the product of but 13 works in the two years, but these include all of the large works. These show 2,153 locomotives built in 1891, against 2,240 in 1890, a falling off of a little less than four per cent. This is better than we had anticipated from the current reports, which have generally been that the shops were slack. The fact seems to be that within the last two or three years the capacity of the private shops has increased so greatly that what is now but a very moderate business for them would have kept them running nights a short time ago. All but three of the shops from which we have comparative figures fell off this year; and there were special reasons why those three should have increased their output. The total output of 15 works this year (two of which did not report last year) is 2 300.—[Railroad Gazette.

The Baldwin Locomotive Works will have built and delivered this year before December 31, 918 locomotives, of which 101 are compound locomotives. This output is less by 35 than the record for 1890, which was the largest ever reached by the Baldwin works. The engines built in 1891 have included nine Decaped locomotives; 219 consolidation engines, with four pairs of driving wheels; 423 with three pairs of driving wheels; 266 are passenger or switching engines, with two pairs of driving wheels, and one rack locomotive was built with a single pair of driving wheels.—[Ibid.

Brightening Aspects of the Financial Horizon.

The brightening aspects of the financial horizon continue to give a salutary impulse to all departments of National growth and productive industry. It is gratifying at the beginning of the new year to find that the excellent record of the relations of the money market to the Treasury during several months past, give evidence of similar results in the near future. In one important part of his policy Secretary Foster has been remarkably successful. He has united the banks and the Treasury, in practical efforts to preserve the ease and quietude of the money market, and that union has been made operative in methods which have tended to the growth of financial confidence and the rehabilitation of private and public credit during the eventful movements of recovery from the languor consequent on the Barring disaster of 1890. * * * One practical result of these and similar investigations is that the combined influence of the government and the banks will tend, in the early future, to give stability to the market; and as this tendency will be favored by the influx of gold from abroad, if it should be found needful, thus to augment our cash reserves, and by the accumulation of idle capital seeking investment, there is abundant reason to accept the view of those bankers who contend that the pessimist views of the money market which in some quarters have prevailed, are not correct or worthy of implicit credence, and that in the present sensitive condition of the monetary outlook, the safest policy for our banks and for the mercantile public is one of confidence and hope, directed by wise foresight, watchful caution and broad accurate views of the changing conditions of public and private credit at home and abroad.—[American Banker.

OUR INLAND COMMERCE.

A FORCIBLE PRESENTATION OF ITS MAGNITUDE AND NEEDS.

Full Text of the Memorial to Congress Adopted by the Water-Ways Convention at Detroit, December 17, 1891.

In advance of its publication in official form *The Iron Trade Review* is enabled to present herewith the memorial adopted by the recent Water-Ways Convention at Detroit. The memorial is the work of Hon. Geo. H. Ely, of Cleveland, whose wide experience, mature judgment and careful study rendered his services of incalculable value to the convention. The document is of much interest and value to shippers as well as statesmen and presents the salient facts in the situation in forcible and convincing style.

To the Honorable Senate and House of Representatives of the United States:

The representatives of the Deep-Water-Ways Convention, held at Detroit, Michigan, December 17, 1891, composed of delegates appointed by the Governors of several States, and by a large number of commercial organizations, interested in the commerce of the Great Lakes, beg leave, respectfully, to present the following facts and considerations:

The Great Lakes contain more than one-half the area of fresh water on the globe. They make up the largest system of deep-water inland navigation on the globe. The topographical relations also of these connected waters—Superior, Michigan, Huron, St. Clair, Erie and Ontario—95,460 square miles, are very remarkable. Lying in general direction, east and west between the 41st and 47th parallels, they penetrate from tidewater on the St. Lawrence, and, (including the Erie Canal) from tidewater at New York 1,400 miles into the heart of the continent—the head of Lake Superior and the St. Lawrence tidewater are on the northernmost parallel, Chicago and New York on the southern. The western extremity of the system is 1,700 miles only from the waters of the Pacific. The range of this water system, it will be observed, is entirely within the limits of the North Temperate zone, on the line on which population most freely moves westward, and where final settlement is most compact, and where the climatic conditions insure the largest returns to capital and labor. For one-half the distance between the two oceans, these waters divide the Dominion from the Great Republic. One hundred and fifty miles northwest of Duluth and Superior are the fountains of three of the great drainage systems of the continent. There were born the mighty influences, proceeding from the physical conditions which send flowing waters, northward to the ocean, through Hudson Bay: southward to the ocean, through the Mississippi Valley and the Gulf, and eastward through the Lakes and the St. Lawrence. For commercial purposes, the northern drainage system is impracticable and useless; but flowing water is now, and forever will be, the potent instrument of commerce, southward and eastward, between the interior and the Atlantic coast.

Such are the peculiar and the favoring physical conditions under which these two great peoples of the English tongue occupy side by side the North American continent, from ocean to ocean. They are nearly equal in territorial area. But while the outlet of these waters flowing eastward, is within Dominion territory, in climate, proportion of arable land and in population the advantage is heavily on the side of the Republic. The Dominion, however, has been far-sighted and vigorous in the policy of utilizing natural conditions and overcoming limitations in national development. She values her great inheritance in this lake system, and has with vastly inferior resources far surpassed us in expenditure for its improvement. On the other hand, how slowly have we come up to the comprehension of the real mission of these waters in the development of our material resources! The whole world knows that the great primary products, whose bulk and weight are large in comparison with value, must reach markets over long distances if they move at all, *by water*. *That* tonnage *must go* by deep-water, and not on wheels. *That* is the meaning of the ship canal at a cost of $30,000,000 between Liverpool and Manchester.

More than one hundred millions in value of products were moved through the St. Mary's River, an average distance of about 800 miles, during the season of 1890, at a cost of one mill and three-tenths per ton per mile, *less than one-fifth* the cost of moving it *on wheels*, if indeed, as to a considerable portion of this tonnage the lowest possible cost on wheels would have permitted it to move at all, and in that event its production at the point of origin would have been impossible. Apply this enormous saving to the movement of products in domestic and foreign exchanges where deep-water is available, and how incalculable the gain in national wealth! What an enormous creation of secondary values! Six hundred thousand square miles of American soil beyond the head of Lake Superior, and (by railroad construction now completed and in progress tributary to it) another like empire, fair but untouched, on the north, await the quickening influence of deeper water throughout these lakes. Were that *here now*, wide, deep channels, insuring safety and freedom of movement for our magnificent ships, broader and deeper would have been the flow of cereals during the last few weeks from the Northern plains to the starving millions of Europe. Inevitably and forever will the vast continental plains and the mountain regions of the Northwest send their products to the head of Lake Superior and Lake Michigan for the remainder of their transit to the Eastern States and to Europe, while from Chicago and the head of Lake Superior will be distributed coal and other heavy products from the East. The territory tributary to these waters includes portions of Kansas, Nebraska, Colorado, Iowa and Wisconsin, and the whole of Minnesota, the Dakotas, Wyoming, Montana and the Northwest Canadian provinces. Two thousand six hundred and two tons of wool and 460 tons of hides were sent here the past season from Montana.

Lake Superior was unknown, unexplored, long after population had moved into the territory bordering upon the other lakes of the system. For two centuries this grandest of all inland seas lay in distant isolation, enfolded

by a wilderness, the coming civilization heralded only by the missionary and the fur-trader coasting along its silent shores. The mineral treasures in its bordering wilderness first drew the explorer up the St. Mary's River. How faint, then, the conception of the commerce destined to pass through that channel! Lake Superior was opened by the completion of the canal and first lock in 1855, at Sault Ste. Marie. The increase of business soon demonstrated the necessity of another and larger one. This was completed in September, 1891, 515 feet long, 80 feet wide, and with 17 feet under water on the miter-sill. From that day to this, with wonderful efficiency, this lock has met the demands of a rapidly increasing tonnage. It passed in 1882, 2,029,000 tons; 1883, 2,267,000; 1884, 2,874,000; 1885, 3,256 000; 1886, 4 527,000; 1887, 5 494,000; 1888, 6,932,000; 1889, 7,516 000; 1890, 9 041,213; 1891, 8,888,759. The freight tonnage was 152,454 tons less this year than in 1890. This is due to the obstruction in the channel on the St. Mary's River caused by collisions and sinking of vessels. General Poe states in regard to this: "But for the delay due to the sinking of "the Susan E. Peck, we would have exceeded the traffic in 1890, notwithstanding the extraordinary low stage of water and the delay in putting vessels in "commission in the Spring. The increase in valuation (of products) for the "season of 1891 over 1890, is nearly $26,000,000. The value of the cargos passing the lock this year was $128,178,208,51. The most notable points in this "season's business is the decrease in iron ore and the large increase in wheat "products." General Poe also states that the number of vessels delayed by the sinking of the Susan E. Peck in the channel, was 275. Their registered tonnage, 285 810. The value of the vessels delayed, $23,294,000, and the *time* of the delay, 827 days 5 hours 12 minutes. The estimated loss caused by this single accident is $146,236.

By the time the lock now in use was completed, in 1881, it became apparent that its capacity would soon be reached. That time has already come, and though Gen. Weitzel, then in charge, in January, 1882, recommended the immediate construction of another lock, we are yet, through no fault of the engineers in charge, four years away from its completion. The plans adopted, under the recommendation of Gen. Poe, for the work now in progress contemplate the grandest hydraulic structure and equipment in the world. This lock is to be 800 feet long, 100 feet wide, and with 21 feet of water on the miter-sill. The estimates of cost were $4 988,865 and for the Hay Lake channel, $2,659,115. Previous to the passage of the last River and Harbor bill, September 19, 1890, two years of precious time were lost from inadequate appropriations. But by that bill the engineer in charge was authorized to make contracts for the entire works. Under this policy these works are now nearly all under contract and we hope will be in use early in the season of 1895. Meantime, our producing and navigation interests will have to carry the risks of dependence on a single lock. Fortunate is it, however, that the old way of making important improvements, so wasteful of time and money, has at last been abandoned.

Twenty feet of water, however, between Lake Superior and Lake Huron, means, and was always intended to mean, twenty feet through every other channel on the lakes. In pursuance of this comprehensive plan Congress, in the River and Harbor act, of September, 1890, called on the War Department for information as to localities requiring improvement and estimates of cost. Gen. Poe reported on the subject January 14, 1891. The principal object of this convention is the consideration of this great subject and to urge upon Congress the necessity of immediate and comprehensive action. We respectfully but most earnestly appeal to Congress for such legislation as will provide for the immediate beginning of work at each required locality and as will insure completion along the whole line by the time the works now in progress on the St. Mary's River are completed. Gen. Poe reports serious obstructions at six different localities. The order in which the improvements should be undertaken, with estimates of cost, are as follows:

Removing obstructions at Sailor's Encampment	$ 556,333.00
Dredging at St. Clair Flats	313,559.40
Dredging at Grose Point Flats	956,825.76
Dredging at mouth of Detroit River	977,850,00
Removing obstructions at foot of Lake Huron	449,512.60
Removing two shoals near Round Island	85,487.00
	$3,339,567.76

The closing statement of Gen. Poe's report respecting these obstructions and their relations to the entire tonnage movement on the lakes are so impressive that we quote them entire in this connection: "Although the sum of "$3,339,568 is a large one, yet the end to be gained by its expenditure is so "important and so pressing as to fully justify its appropriation, even in one "act. During the season of 1890 over 9,000,000 tons of freight passed through "St. Mary's River, and more than 22,000,000 tons through the water-way "between Lake Huron and Lake Erie. The increase in the available depth of "channels on the lakes from 9½ feet in 1852, to 16 feet in 1882, developed this "commerce, and it is only reasonable to expect that a further increase of 4 "feet will be by corresponding increase in the shipping. The results are "most notable, perhaps, in the character of the vessels employed in the carrying "ing trade. These have increased in size and sea-worthiness until they form "a fleet which has not its equal upon any inland waters on the face of the "globe. Of large capacity and great power, regardless of wind or weather, "the steamers of the prevailing type bear their cargos to and from ports a "thousand miles apart, with the precision of railroad trains, each of them "transporting at once more than ten ordinary freight trains. Surely such a "commerce deserves every aid and encouragement that can be extended to it. "Give it channels practically navigable upon a draught of 20 feet, and it needs "no prophet to predict a wonderful growth, but only a prophet could foretell "its degree. For nearly 35 years I have watched its increase, but neither I, nor "any one else within my knowledge, has been able to expand at the same rate. "The wildest expectations of one year seem absurdly tame the next. For all "the lakes and their communicating straits above Ontario, channels of the "character described can be secured at a cost which seems trivial in comparison with the end to be gained."

The ton-mileage of these lakes last year was equal to 25 per cent. of the total ton-mileage of all the railways in the United States. The work was done by 2,075 vessels, representing a floating capital of $63,000,000. Five articles, wheat, corn, coal, iron ore and lumber, made up 90 per cent. of the total tonnage movement. Of our 63,000,000 population, 26,000,000 live in the eight States that border on these lakes, and 6,000,000 more in the West and Northwest largely depend upon them. It would seem as if this water-way had vindicated its own cause by the demonstration of facts. It has already, in the reduced cost of transportation to producer and consumer, returned twenty-fold all the money expended upon it. It asks now for the grand consumation predicted, sought and labored for during the last 15 years—deep-water navigation, as set forth by Gen. Poe's report throughout this water-way. The expenditure will be over a period of at least four years, but $3,339,000 is a trivial sum in view of results.

Our government expenditure for internal improvements through most of the century behind us has been slow, hesitating, inadequate. Canada has pursued a broader policy. With less than one-twelfth of our population, a less favorable cliamte, and with natural resources far inferior to ours, she has fearlessly grasped her great and difficult transportation problems. On her water-ways she has expended (largely on this lake system and the St. Lawrence) $54 596,189. She is now constructing a lock and canal at the Sault, and is deepening all her St. Lawrence canals to match the Welland draft. She has built and equipped 1,217 miles of railway at a cost of $51,557,579. With 12,628 miles of railway in operation in 1880, the Government has given to railways in

Bonuses	$135,894,304
Loans	21,201,314
Provincial Government	24,036,307
Municipalities	13,461,224
	$194,593,149
In all for railways	$246,150,728
In all, railways and canals	$300,746,917

In addition to these expenditures Canada has made grants of land to corporattons, which have operated, as with us, in returns of equal value to the Government.

The United States Government has issued bonds in aid of the Pacific railroads	$64,623,512
Has paid interest thereon	86,363 968
	$150,987,480
These roads have paid to the Government in transportation and in cash	$ 38,943,584
Balance of indebtedness	$112,043,896

This expenditure by the Government in aid of the Pacific roads was a wise and necessary one. The amount will be returned. The total appropriations of the United States Government for rivers and harbors have been $204,137,649. They began in Jefferson's administration, 1809, with $25 000 in the State of Louisiana; $14,699,745 were expended previous to 1860; between 1860 and 1870, $12,789 182; between 1870 and 1880, $68,035,656; between 1880 and 1890, inclusive, $108,613 066; 204,000,000 only in a century for great objects of national development! Of this amount, $28,417,182 *only* have been expended within the eight great States bordering on this lake system, and for it. improvement.

In relation to this portion at least of the total appropriations for rivers and harbors since our national life began, it may safely be asserted that the expenditure for public purposes of no equivalent sum, elsewhere on American soil, has ever resulted in so large and so equitably distributed advantages to the American people. The inference is unavoidable that these great works should be hastened to completion by every resource within the control of the Government.

[Here follow the resolutions printed in our last week's issue.]

SPIRIT OF THE TRADE PRESS.

SHIFTING MANUFACTURING CENTERS.

A Prediction as to Natural Gas.

From present indications the Western Pennsylvania fields will outlast those of Ohio and Indiana.—[Engineering and Mining Journal.

The Little Michigan Furnaces Must Go.

The Deer Lake furnace is idle, the Northern also, and many more that have small capacity will follow suit. Like many other enterprises, it is a survival of the fittest, and the small stacks are certainly badly handicapped in the race for recognition and profit. There is too much expended in labor for the ton of iron made. The Deer Lake has had a splendid record, has been as economically handled as any property similarly situated in the country, and the management could not have done better. But when the modern plants possessing a capacity of ten times that of this cannot make a dollar, then it is useless for the little ones to try.—[Iron Ore, Ishpeming, Mich.

Factors in Determining Future Centers.

The future centers of this industry are as yet undetermined. There are many possible and qualifying conditions, not as yet in the line of calculation or forecast. The science of mining is not yet at its best, the transport of ore and fuel has a wide margin for new and cheaper methods, and the process of manufacture may yet be quadrupled in efficiency and science. These possibilities will considerably affect the question of proximity between material and markets as determining the center of the pig iron industry. The future sites of manufacture are to be determined by the possibilities and conditions named. The iron industries in Pennsylvania, New York and the lake region, with the South and the West, in the field, and Canada a potent factor in production, will each and all be contributory to the general result, with a permanence of demand insured all round, but with a doubt as to whether any one section or State will so lead the rest as to dictate prices or monopolize trade —[Age of Steel.

Compensations for Changing Conditions.

The course of trade presents some interesting phases with reference to the greater industries affected in various cities. It was not so very many years

ago that Chicago was the center of the grain carrying trade of the United States, and it might almost be said of the world. The development of that business in Minneapolis, the growth of Duluth and West Superior, diverted much of it from Chicago, but it did not hurt the latter city a particle. On the contrary it was beneficial, as the capital there at once diverted its attention to the development of manufacturing, so that to-day Chicago is one of the greatest manufacturing centers in the world. Cleveland is now going through the same revolution. For years it has been the center of ore traffic, it being the greatest ore port on the Great Lakes: but much of this traffic has recently been diverted from Cleveland to other distributing points, and capital there is gradually turning its attention to manufacturing, in a way to make the growth of that city more solid and substantial, and to enable it to marshal annually an array of figures which indicate a larger volume of business than ever before in its history. We think the time will come when Minneapolis will undergo a similar experience. It may be Duluth or West Superior will gain the carrying trade, and when that time comes, which we do not think will be in the immediate future, Minneapolis' growth will be more solid and substantial because of the development of manufacturing enterprise. In these instances there has been no loss without a greater gain.—[Hardware Trade.

SOME FRESH TARIFF POINTS.

Good Effects of the New Law.

Commenting on the summary of iron and steel imports for the first ten months of 1891, the *Bulletin* of the American Iron and Steel Association says: "Our table shows that there has been a decline under the McKinley act in the imports of scrap iron and steel, bar iron, wire rods, anvils and chains. The new duty on cotton-ties and hoops has prevented any imports of these articles, and the change in the duty on steel rails is found to have worked no injury whatever to our steel rail interests.

The Tinplate Duty No Injustice to Consumers.

Such an idea as that the present tariff on tinplate will weigh heavily on the consumer, is ridiculous. The tinware used in this country is made out of tinplate, which is about 95 per cent. iron, and 5 per cent. tin, so that even if, for the next few years and until our industry has been permitted to develop, there should be an additional cost of 15 per cent. on the tin, it would not make a difference of one cent per capita according to the entire population of the United States.—[American Tinplate Review.

Welsh Tinplate Makers "Rattled."

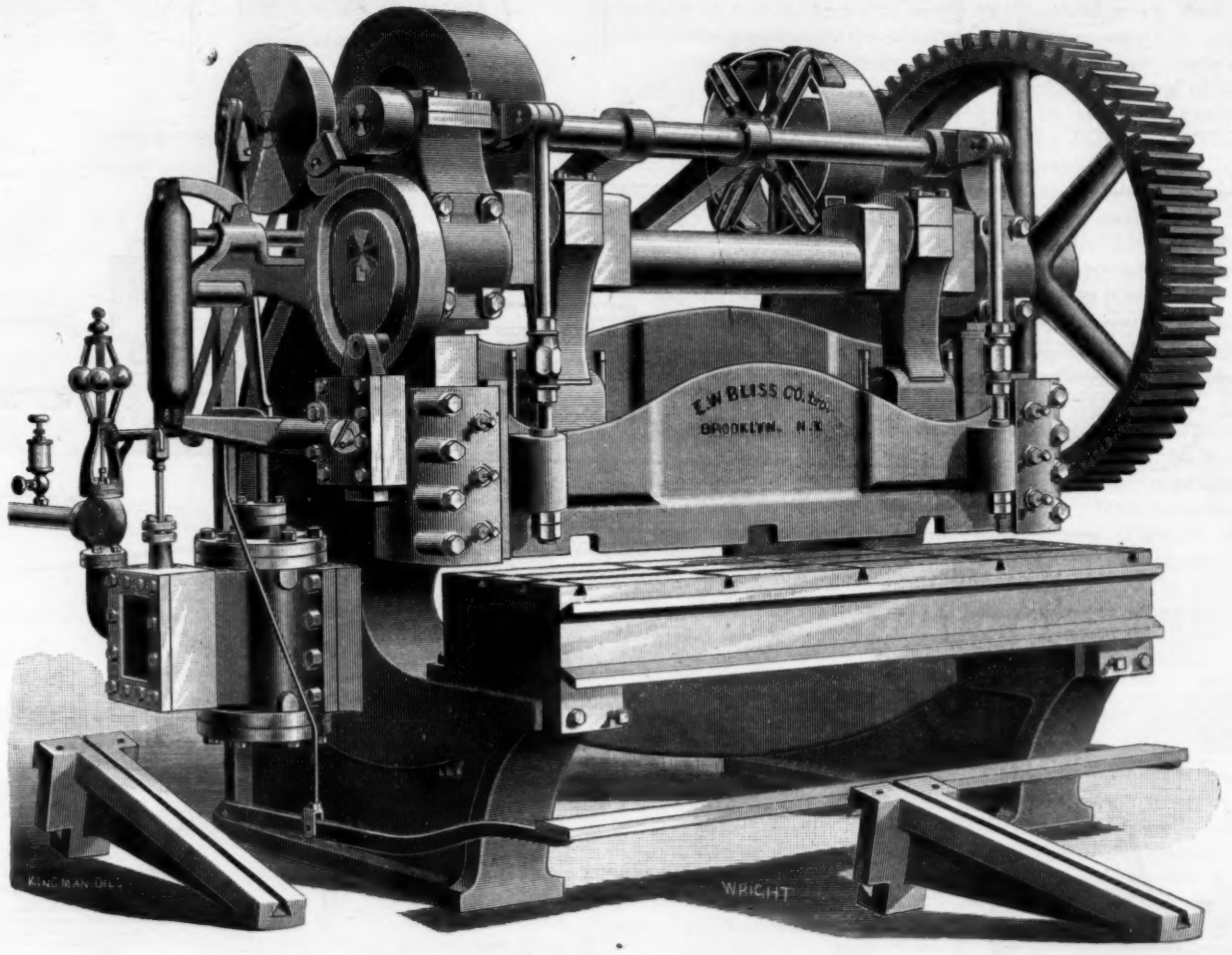
The tinplate makers of South Wales "resolved" to have a stop month and then "resolved" not to have a stop month. This seems somewhat strange and confusing to people not familiar with the local situation in the tinplate trade. At the first meeting, when the resolution to stop was proposed, the manufacturers were not fully represented, and while the sense of the majority present was reflected in the recommendation "that a combined reduction of make" was advisable, the meeting could not be considered a representative one, nor the resolution as being an expression of the views of the whole trade. * * * Following the conference, however, a joint meeting of employers and workmen was held, at which strong opposition to the proposal for a combined stoppage of the works was manifested. This sentiment had crystallized into a resolution at the prior meeting of the manufacturers. The situation may therefore be summarized in an expressive but not too elegant figure of speech, "Go as you please."—[American Artisan.

NO. 480 SLATE SHEAR FOR ROLLING MILLS.

The shear shown in the accompanying engraving is adapted for cutting plates or packs of sheet iron and steel from ⅛ inch up to one inch in thickness, according to the size of machine. Its novel feature is the device employed in starting and stopping it. Instead of using a clutch on the main crank shaft on which, when the clutch is in operation, the driving gear runs loose, the gear in this case is keyed rigidly to the shaft, and a friction clutch is placed upon the pinion or fast-speed shaft. The shifting bar operating this clutch is connected with a lever and the counterweight, shown at the left-hand side of the cut. On the main crank shaft is a cam operating a slide working in vertical guides upon the housing. The mechanism is so arranged that when the cranks are in their upper position, so that the shear knives are open to receive the work, a latch in the slide acts to raise the counterweight and hold the friction clutch out of gear, thus allowing the cutter bar to stand at rest. Depressing the treadle throws the latch out of gear, allowing the weight to drop, which action throws the clutch into operation and starts the machine. When the crank shaft has made one revolution the cam above referred to depresses the slide, thus lifting the counterweight and stopping the machine. All of these movements are very easy, and, accordingly, there is no shock or jar in starting, and as the train of gearing is at rest when the cutter bar is not moving, the shaft is held securely with the cranks at their top center, with no tendency to drop back or ahead, even though no counterweight is used to balance the cutter bar.

This shear is made with blades from 6 to 10 feet in length, as noted in the accompanying table of dimensions and prices. There is sufficient gap in the housings to allow a plate of 36 inches wide being split through the center on the smaller sizes of shear, and one 48 inches wide on the largest size. Immediately in front of the cutter bar is a clamping bar, which, when the machine is started, descends automatically and securely holds the work in place while the shearing is in progress. The machine is geared about 20 to 1, and is driven by an engine of the plain slide-valve variety attached to the housing.

The crank shaft is of hammered steel, with cranks forged solid and slotted out. In order to compensate for wear of blades, the lower one is supported on a long wedge. By setting up on this the cutting edge of the blade is kept level with the table. The upper blade is adjusted downwardly by lowering the cutter bodily.



NO. 480 SLATE SHEAR FOR ROLLING MILLS.

Sharpening Tools by Electricity.

An electro-chemical method of sharpening files and other tools, is being used with satisfactory results, both from a practical and economical point of view. The files, which have first been thoroughly cleaned, are immersed for 20 minutes, suspended in a metal plate in a mixture of 100 parts of water, six parts of nitric acid and three parts sulphuric acid. The plate is placed in connection with a number of carbons immersed in the same liquid. The corrosion of the metal takes place in the cavities only, so that the edges are sharpened in exactly the same manner as if the operation had been performed by a file cutter.

HOLIDAY rates on the Nickel Plate, December 23d to January 1st, inclusive. Returning to January 5th, 1892. One fare for the round trip.

TRAVEL on the Nickel Plate and receive the benefits of Holiday rates, December 23d to January 5th, 1892.

THE BEVINGTON PROCESS OF WELDING METALS AND SPINNING AND SHAPING TUBES.

The illustrations accompanying this article represent an entirely new and improved method of welding metals and spinning and shaping tubes. It is the invention of James H. Bevington, but is owned and operated by the New Process Welding & Spinning Co., Rialto Building, Chicago, by whom it has been very intelligently developed. It was submitted to the sub-committee of the Committee on Science and the Arts, constituted by the Franklin Institute, Philadelphia, of the State of Pennsylvania, to whom was referred, for examination and report thereon. At a stated meeting of the Institute, June 17, 1891, the process was explained and a handsome display of products was exhibited and ordered referred to the committee as above, and if proper, for award. The result of their investigation was that the invention was entirely novel, simple, easily managed and economical, and did not require a costly plant to manufacture. The committee were of opinion and so resolved that it deserved recognition by the award of the Elliott Cresson gold medal. The foregoing was adopted September 2, 1891, by S. Lloyd Wiegand, chairman of the Committee on Arts and Sciences of the Franklin Institute.

We extract the description following from the Journal of the Franklin Institute:

The invention consists in forcing strips, rods or tubes of ductile metal into converging revolving dies of harder metal, in which it becomes heated and compacted and acquires the shape of the interior of the die. By employing a converging forming guide, the opposed surfaces of the ductile metal guide together like the binding guide of a sewing machine, and a tube may be made from a strip of ductile metal which, passing through a hollow non-rotating sliding arbor in which it is clamped firmly, it is forced into a funnel-shaped steel die, and becomes welded so soundly that the seam is of equal strength with the rest of the metal, and in fact cannot easily be detected without inspecting the interior surface. Instead of supplying the strip of metal endwise, with edge parallel with the axis of the tube, the strip may be introduced obliquely and wound helically on the tube, the welding operation being conducted in the same manner in the converging die, seamless tube being the result. Separate wires, with the ends scarfed, placed in a similar die and similarly located, become firmly welded. No fluxes are either used or required. Tubes are reduced in diameter and extended in length by this process, and, what appears remarkable, although no core is used to sustain the metal internally, the thickness of the metal of the tube, when reduced in diameter, remains without any material variation the same, and the degree of temper or hardness and elasticity of the metal do not appear to be impaired by this process. The apparatus is shown in the accompanying engravings reproduced from the drawing of the inventor's specification.

The first illustration shows the application of the invention to contracting, and closing and welding the ends of tubes. Fig. 1 represents a sectional elevation of a lathe for spinning tubes or other straight articles according to this method. Fig. 2 represents a horizontal longitudinal section of the same in the plane of its axis showing the die or former used in the process of reducing a metal tube to one of smaller diameter. It also shows the tube before being operated upon. Fig. 3 is an end elevation of the die or former. Fig. 4 shows a lengthwise section of the die and also a tube before reduction. Fig. 5 shows the tube and die after the tube has been operated upon. Fig. 6 is a longitudinal section of a die where it is desired to close the end of the tube. The tube is also shown. Fig. 7 is a view showing the operation completed. Fig. 8 represents the die used to weld two tubes together for the purpose of lengthening the same.

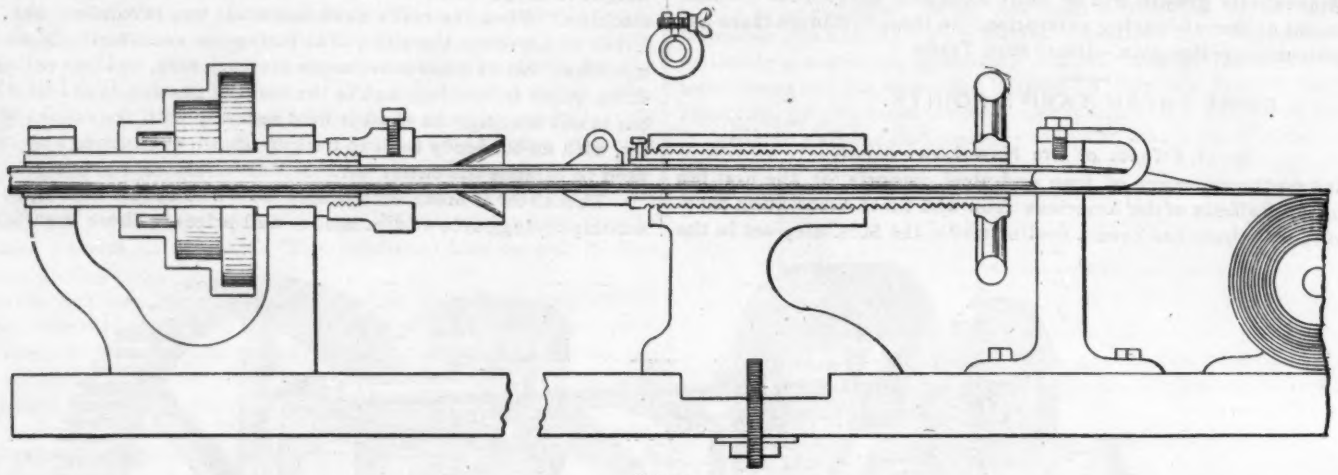


FIG. 1.

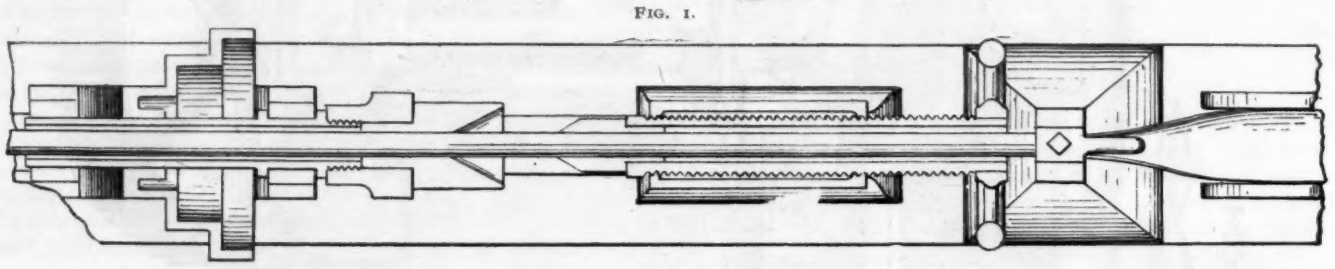


FIG. 2.

FIG. 15.

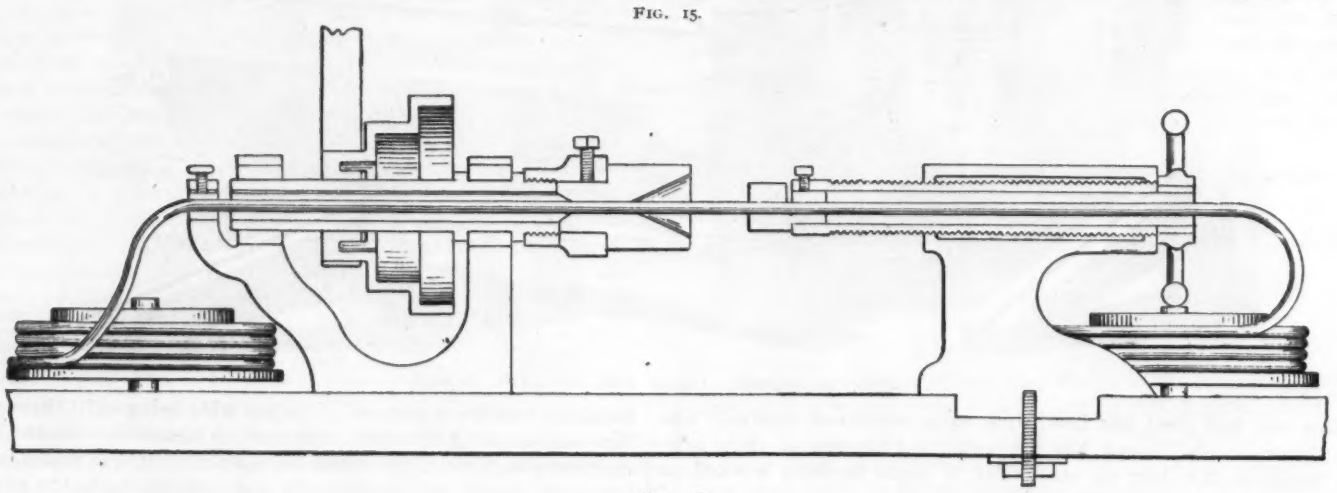


FIG. 16.

THE BEVINGTON PROCESS OF WELDING METALS AND SPINNING AND SHAPING TUBES.

Figs. 9, 10, 11, 12, 13 and 14 represent some of the different results accomplished by the process of reducing and increasing the diameter and closing the ends of the metal tubes. Fig. 15 shows a detached view of a tube as partially formed from a strip of metal. Fig. 16 shows the invention as applied to welding the ends of wires or rods.

The machine adapted to carry out this process is substantially a lathe with hollow arbors in both the head and tail stocks. A conical die is secured upon the inner end of the hollow arbor of the head stock so as to turn with it. This die is of very hard metal, and has a central perforation running through it, conical or flaring at each end, the opening at the inner end being much larger than the one at the other end. The hollow spindle of the tail stock is screw-threaded and is mounted in a threaded bearing so that it can be set in and out, for which purpose it is provided with a hand wheel. A contractible clamp is set in the inner end of this arbor, which is adapted to hold the rod or wire from turning as well as lengthwise. The engravings show this machine in operation upon wires The two wires are preferably prepared by scarfing or by cutting the ends upon an incline, as shown in Fig. 17, so as to give each a corresponding bevel. One of the wires is thrust through the hollow shaft and part way through the die, and the wire is fastened in this position by means of the clamp at the rear of the head stock. The other wire is inserted

in the tubular spindle of the head stock and passed out through the clamp a little way, and is then firmly secured in place by means of this clamp.

The arbor of the tail stock is then fed inward until the beveled end of the wire is forced into the die and brought firmly against the bevel of the other wire. The die is then very rapidly revolved by the means already explained, while, of course, the two wires are held in a fixed position and forced together. During this rapid movement of the die, a very high degree of heat is developed by frictional contact, which is of sufficient intensity to heat the two ends of the wire to a welding heat and perfectly weld them together along their contact faces. The union thus obtained is as complete and perfect as a welded joint can well be made, and, owing to the action of the die, the joint is smooth and in fact almost imperceptible, the finished wire presenting the appearance of a smooth cylinder, seen in Fig. 18.

Obviously, with the machine constructed as described above, the wire, after being welded, must be drawn through at one end of the machine. For this purpose the wires are upon spools at each end of the machine. After welding, the wire may be drawn through, being run off from one spool and wound upon the other, the clamps, of course, being loosened for this purpose, and so length after length of wire may be joined together to form a line of any length desired. Two rods may be welded together in the same way, one being set in the head stock and the other in the tail stock, and both clamped as

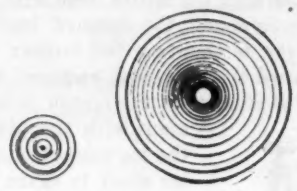


FIG. 3.

FIG. 4.

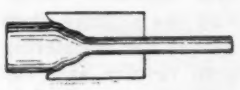


FIG. 5.

FIG. 6.

FIG. 7.

FIG. 9.

FIG. 10.

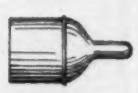


FIG. 11.

FIG. 12.

FIG. 13.

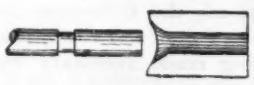


FIG. 8.

FIG. 14.

FIG. 19.

FIG. 18.

FIG. 17.

FIG. 20.

described. The operation will be understood without any further explanations, the rod set in the tail stock being fed up forcibly against the end of the opposite rod. This process of welding may be successfully applied to wires and rods of very considerable size; the process has been practically tested with entirely satisfactorily results on rods of different sizes, up to one inch diameter and probably may be carried on successfully with even larger sizes.

The invention is applied to forming tubes of metal, as shown in Figs. 1 and 2. The machine used is a lathe, as previously described, with some additional features. The tail stock is hollow, and suitably threaded to serve as a feeding device, for which purpose it is provided with a hand wheel on its outer end. A clamp is set in the inner end of the arbor of the tail stock, being of any suitable construction to clasp and firmly hold a round tube. It is shown in Fig. 10, in the well-known form of a divided ring with a screw for the purpose of drawing the two parts together. A standard is mounted upon the bed beyond the tail stock, and on this standard is mounted a mandrel which corresponds in size to that of the required tube. This mandrel extends just through the standard, which is provided with an aperture for this purpose, a little larger than the mandrel, its diameter corresponding to the outer diameter of of the tube. At its outer end, the mandrel is bent upward and backward upon itself, and this upper turn or member is fastened to the top of the standard by means of a screw body, as seen in Fig. 1, or in any other suitable way. The metal plate from which it is intended to form the tube, is cut into a strip or strips of such width as to form a tube of the desired size, when rolled up in a circular form with the opposite edges brought together; this strip or strips may be wound upon a suitable drum a little in front of the mandrel standard, where the strip is shown wound or coiled upon the drum, the latter being free to turn its axis so that the strip may be run off.

The operation is as follows: the metal strip wound upon the drum as described, is led thence through the aparture in the standard, bent around the mandrel, by which operation it is formed up and around the mandrel in the shape of a tube, the edges of the plate being brought close together, but of course, not joined. The end of this unclosed tube is carried along the tail stock; and in the revolving die, the clamp is then closed tightly upon the tube, and the revolving die set in motion. The tail stock, which, in the first instance, is drawn back as far as possible, is now set up gradually, thus feeding the unclosed tube into and through the revolving die, and by the action of the hard-faced conical die, the tube is heated to a welding heat, and the edges thoroughly and completely welded together, thus closing the joint and leaving a perfectly smooth and finished surface. The feeding of the tube through the the die will, of course, draw the strip from the drum and through the form aperture in the standard, thus continuously forming up the tube round the mandrel during the feeding operation. With the device here shown, it is obvious that when the limit of the feed movement of the tail stock is reached, the clamp must be loosened; the tail is again retracted, the clamp refastened, and the feed forward is again made. The tube, delivered from the hollow shaft will be a completed product, with the joint perfectly closed and smoothly finished by the action of the die, so as to present a seamless appearance. It is evident that the metal from the drum to the hollow shaft will present three different conditions; the first section between the roll and forming mandrel, is straight, but with edges gradually turning upward and forward, as seen in Fig. 2, and the second section, between the mandrel and the revolving die will be in the form of an enclosed tube, as indicated in Figs. 2 and 15, while the last section, beyond the revolving die, will be a finished tube. It will be seen that in carrying out the process with the apparatus herein shown and described, the feed is intermittent, but that a tube can be made of any length desired. It is also evident that if a feed mechanism were applied to the tube by which the metal would be drawn through the machine by a slow, continuous movement, the action of the devices would be constant, there being no intermission in the feed. Sections of welded specimens show the weld to be perfectly solid and fully equal in strength to the rest of the material. The capacity of this invention for uses in the arts seems to your committee as almost unlimited, when circular forms of ductile metal are required. The series of helically coiled or twisted wires welded as shown in Fig. 20 is one of the many interesting specimens produced by this invention. It has already been applied commercially, with satisfactory results, to cartridge cans for dynamite projectiles, and, so far as the committee can judge, develops fully the best strength of the material. In the opinion of the committe the invention appears entirely novel, is simple and easily managed and economical, and does not require a very costly plant. Upon the recommendation of the committee it received recognition by the award of the Elliott Cresson Medal.

Leading in Iron Ships.

According to an advance synopsis of the report of William W. Bates, commissioner of navigation, the documented tonnage on the Northern lakes June 30, 1891, was 1,154,870 tons. The entire documented tonnage of the country is 4 648,759 tons, represented by 23,889 vessels. Iron vessels measuring 57,989 tons were built on the lakes during the year. This is more than half of the iron vessels built in the entire country. Atlantic coast shipyards built 46,265 tons of iron, and there was built in all parts of the country 105,618 tons.

The following table shows the tonnage, apportioned in respect to the several grand divisions of the country:

Grand Divisions.	1888. No.	1888. Tons.	1889. No.	1889. Tons.	1890. No.	1890. Tons.	1891. No.	1891. Tons.
Atlantic and Gulf coasts...	604	83,168 43	657	93,912.24	663	156,755.99	944	218,392.46
Pacific coast.....	104	21,956.43	112	17,939 43	93	12,334.92	122	19,069.84
Northern lakes.....	222	101,102.87	225	107,080.30	191	108,525.87	204	111,856.45
Western rivers.....	84	11,859.15	83	12,202.36	104	16,505 98	114	19,983 54
Total.	1,014	218,086.88	1,088	231,134·33	1,051	294,122.76	1,384	369,302.29

The documented iron tonnage on the lakes is 181,724 tons, and on the seacoast 554 963 tons. The entire documented iron tonnage, including that of the Western rivers, is 741,598.24 tons. The documented tonnage on the Northern lakes June 30, 1891, was 1,154,870 tons; on the Western rivers, 308 345 tons; on the Pacific coast 440,858 tons, and on the Atlantic and Gulf coasts, 2,780,683 tons.—[Marine Review.

Ironmaking in Brazil.

A bulletin recently issued by the Bureau of American Republics states that the State of Minas Geraes, in Brazil, abounds with iron ore. It is not found in veins or strata, buried deep in the earth, but in enormous beds, often lying at the surface, or in mountain masses. These vast deposits are worked only by small scattered furnaces, charcoal being used in the reduction of the ore. Of these small furnaces there are five groups, producing about 3,000 tons annually, the product being used in the surrounding districts in the manufacture of articles of home consumption, such as hoes, shovels, picks, drills, nails, horseshoes, etc. In the State of Sao Paulo are found deposits similar to the best Norwegian ore, and one of the mines is worked by the government establishment, near the village of Sorocaba. This establishment has two furnaces, and produced in 1887 790 tons of pig iron. The ore has about 67 per cent. of iron. In Santa Catharina, not far from a harbor which is accessible to the largest vessels, are vast deposits of hematite, containing 30 per cent. of manganese and 25 to 30 per cent. of iron.

Another Ship Canal.

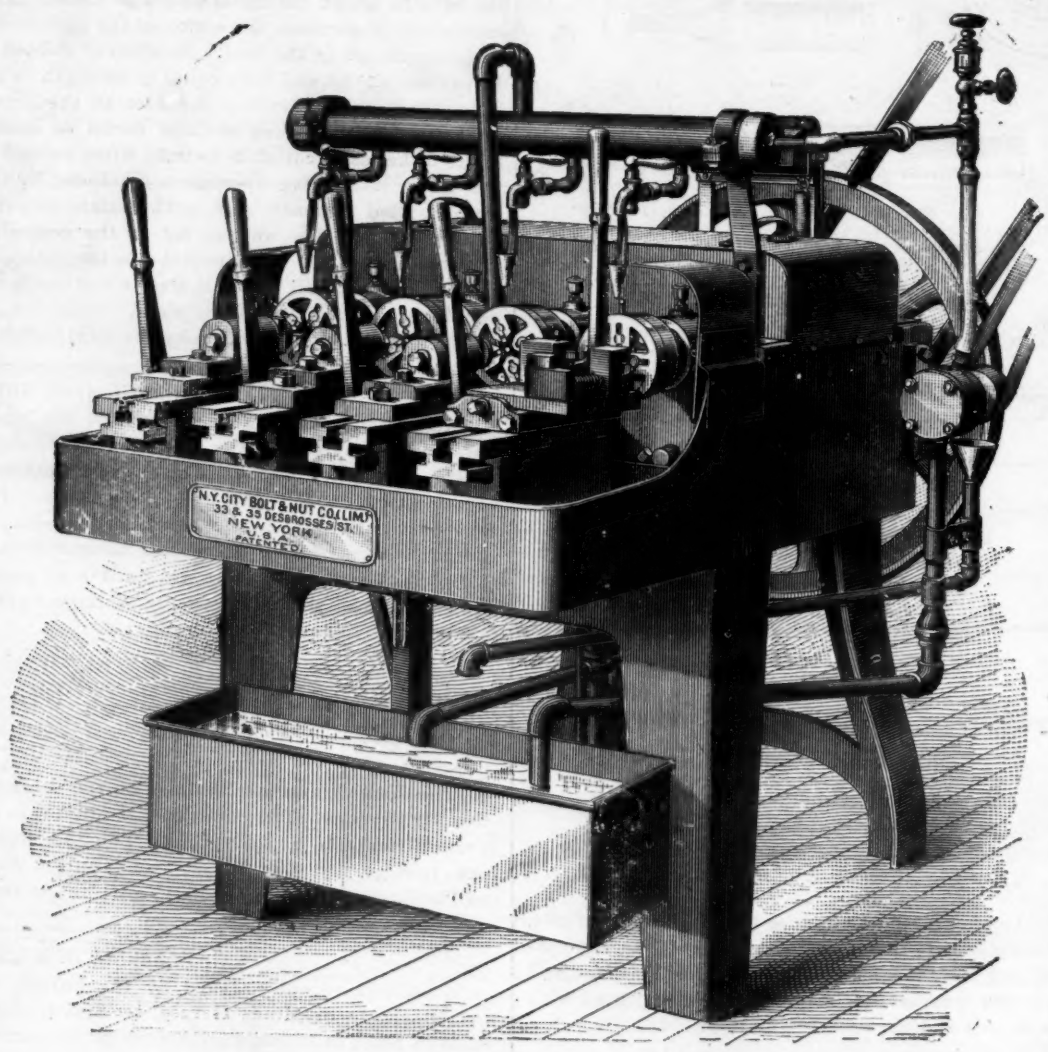
Hon. W. C. Gear, of Wyandot, who will be a member of the next Ohio State Senate, gives the outline of a bill, which he will introduce early in the session, providing for the construction of a canal to connect the Ohio with the lakes. Senator Gear's proposition is to divert the course of the Ohio Canal into the Muskingum, recently improved by the Government, at Dresden, which would permit Lake Erie boats to enter the Ohio river at Marietta while he would divert the course of the Miami and Erie into Mill creek at Cincinnati. Senator Gear, who is a civil engineer, estimates the cost of the Miami and Erie improvment would be about $18,000,000, while that of the Ohio canal would amount to $10,000,000.

MACHINE FOR THREADING BOLTS.

The New York City Bolt & Nut Co., Limited, of 33 and 35 Desbrosses street, New York, have recently completed a bolt-threading machine of new design and unusual capacity. It is the invention of Emil Hubner, superintendent and manager of the company. It will thread four different sizes of bolts at the same time and four different kinds—viz., fish plate, machine, countersink and button head. It is stated that one man can thread 15,000 bolts during a day of ten hours with this machine. A registering attachment accurately counts the numbers of bolts threaded, thereby doing away with the necessity of having a man count the work performed.

In general the machine consists of four shafts, each of which carries a threading die. The bolts to be threaded are held in suitable recesses serving as chucks, the dies are advanced to thread the blank and at the proper time the motion is reversed automatically and the die withdrawn at twice the speed at which it advances. It is evident that the dies may be changed to suit the bolt it is required to thread, and that practically the four are independent in operation. Fig. 1 is a perspective view of the machine, taken from the front; Fig. 2 is a plan view, and Fig. 3 a vertical sectional elevation through one of the threading shafts. (See page 9)

The bed A of the machine is box-like in form, comprising a continuous bottom with upright sides and ends. It is rectangular in general outline and at one end is formed with an extension, A′, of less width than the main bed. The latter is also provided with three transverse partitions, as shown in both drawings. The driving shaft B is mounted as shown and extends centrally part way through the bed. On the outer end of this shaft are secured a suitable driving pulley and fly-wheel. In bearings formed near the upper edges of the partitions referred to is a series of tubular shafts, C, D, E, F, each of which at its forward end is provided with a head, to which is attached any improved form of die adapted for cutting a thread. Each shaft is further provided with two gears, a large one, G, and a smaller one or pinion, H. In order to economize space and obtain differential speed the gears are alternately arranged, the pinion on one shaft being transversely opposite the spur gear upon the next shaft, as illustrated in the plan view. Between the gears of each shaft is a sleeve, I, having clutch at each end, and which is splined to the shaft in order to permit longitudinal movement thereon and at the same time impart a rotary motion. The faces of the gear hubs opposed to the clutch faces of the sleeves are constructed to receive these faces. The large gears are the driving gears while the thread is being cut, and are calculated to drive the tubular shaft at a predetermined speed; the small gears act as the driving gears upon the reverse movement of the shafts, which withdraws the bolts from the dies. Since the pinions contain one-half the number of teeth that the gears do, the threaded bolt is released at twice the speed at which the thread is cut.



MACHINE FOR THREADING BOLTS.

A shifting shaft K is held to slide in bearings beneath each tubular shaft. These shafts are operated upon to reverse automatically in substantially the same manner, but they are differently operated upon to impart to the tubular shafts a movement for cutting the thread. A description of one will therefore suffice for all. Within the tubular shaft a rod is held to slide, the forward end of which is provided with a pin, while the rear end extends beyond the shaft and is arranged to strike against the head of a stud shown plainly in the vertical section, Fig. 3, adjustably secured to the upper end of a vertical lever, pivoted at its lower extremity upon one side of the bed extension. Upon the pivoted end of the lever a horizontal, upwardly extending latch is attached which engages with a head upon the rear end of the shifting shaft K while the bolt is being threaded. This shaft is encircled by a spiral spring, as shown. When the head of the latch and shaft engage the spring is compressed and when the head of the shaft is released, the spring throws the shaft forward. The shifting shaft and the clutch I of the tubular shaft D are rigidly connected by a bar secured to the collar L. The forward end of the shifting shaft is connected by a link, M, with a fixing lever. When the fixing lever is pushed forward the shifting shaft is forced to an engagement with the latch. Around the fixing lever a hollow base block is erected upon the bed, having flanges at its inner edges forming slide-ways. Upon the block is a table arranged to slide longitudinally and provided with grooves in its sides to receive the slide-ways. This table has integral with its rear end a downwardly extending arm, shown to the right of shaft K in Fig. 3. The movement of the table is accomplished through the medium of the lever N, which is pivoted at one side of the base block and attached to one side of the table. A vertically adjustable tail block, designed to carry the blank, is carried by the bed block. This is formed with a recess, the interior of which corresponds with the bolt head it is to receive. When the head of the blank bolt is placed in the retaining head the end of the shank to be threaded, when the socket is properly adjusted, will be in a position to enter the dies of the cutter.

In the operation of this portion of the machine, when the thread has been cut upon the bolt the desired length, the bolt presses against the pin of the sliding bar in the tubular shaft D, which at its rearward movement operates the lever sufficiently to relieve the catch from connection with the shifting shaft K, which is forced outward by the action of the spiral spring, causing the clutch I to disengage from the large gear and engage with the pinion. The movement of the tubular shaft is thus instantly reversed and the speed increased, causing the die to rapidly leave the threaded portion of the bolt. By moving the lever N forward a slight distance the entire head with which it is connected is moved in the same direction, and the finished bolt may be removed and another inserted. The lever is then carried further forward, when the shifting shaft is moved rearward and its head engaged with the latch. This continued movement of the shaft throws the clutch into engagement with the pinion, and the movement of the tubular shaft is again reversed and its speed decreased.

The rearward movement of the shifting shaft also causes the registering shaft to revolve and the finished bolt is thereby duly counted. A headstock of the construction described is provided for each tubular shaft, likewise a latch, lever and post, link lever and a ratchet wheel for recording purposes. The movement of the shifting shaft of the second tubular shaft is the reverse of that just described, the difference in operation of the two shafts being made necessary by reason of the difference in the position of the gears upon the driving tubular shafts.

In operating the machine the attention of but one man is needed. Starting at the shaft C, for instance, the bolt is placed in position to be threaded, and when it has been cut by the dies a second bolt is placed so as to be operated upon by the next shaft, D, and when this has been cut a bolt is placed in the shaft E and then in the shaft F. It will be noted that by this time the first bolt placed in position has been threaded and is ready to be removed and another one inserted. The only work required of the attendant is the insertion and removal of the bolts, and the machine can be so speeded that his entire time will be taken up with this work. The machine is provided with an oil reservoir into which all oil drains, and from which it is conveyed to the dies by means of a pump and suitable pipes.

Writing to *The Iron Trade Review* regarding this machine, the manufacturers say: "We claim that it is a labor saving machine because it has an automatic register that registers the number of bolts screwed, thus doing away with the necessity of having men to count the work of the pointer and screwer, as the men employed at these machines are paid by the 100 bolts and not by the day. We claim that the money saved in repairs on this machine will more than guarrantee the investment in one or more of these machines, because the machine is so simply constructed and its vital parts so thoroughly protected that it is an impossibility to get out of order or break. An important part in connection with this machine is the dies used. A sectional die is used that can be replaced at a few cents, and requires but little time to make a change."

DURING the past season 52 vessels were lost upon the Great Lakes, their valuation being placed at $845,600. Besides this there were many losses by collisions and running aground. The need of improved harbors and channels is most urgent.

THE Nickel Plate makes one fare for the round trip, December 23d to January 1st, inclusive, account Holidays. Returning limit to January 5th, 1892.

PROTECTING YOUR BUILDING With an automatic fire sprinkler system makes it absolutely fire proof. All Insurance Companies recognize the "Neracher" as the best made and will make liberal reductions on your present rates if you equip. In this way the system pays for itself inside of two years' time.

☞ Write us.

THE NERACHER SPRINKLER CO., - WARREN, O.

BRANCH OFFICES:

Boston, Chicago, St. Louis, Cleveland, Cincinnati, Minneapolis, Pittsburgh, New York, Philadelphia, Baltimore, San Francisco.

CABINET PLANER AND POLISHER.

The machine herewith shown is made to plane 30, 36 and 42 inches wide and 6 inches thick, on one side only. It has two top cylinders, one to do the rough work and the other for polishing. The roughing cylinder is belted from both ends, the other from one end. Two knives are used on each. The heads are made from steel forgings and lipped to prevent tearing the lumber. The bearing are all two inches diameter and eight inches long except the one on finishing head next to the driving pulley, which is 12 inches long. The finishing cutter-head is set $\frac{1}{32}$-inch below the roughing head, and as all the dirt, etc., is taken off by the first head, the knives remain sharp for a long time. This machine can be fed 50 lineal feet per minute and do the finest kind of work, and by using a slow feed the doors for cabinet work, etc., can be planed as well as on a diagonal planer. Both heads have yielding chip breakers or pressure bars on each side of the heads which helps to secure perfectly smooth work. The feed rolls are 4½ inches diameter and all driven. The bed is cast in one piece and set into the frame 1⅛ inches deep, and all play can be taken up by a strong gib at each end of the machine. The bed is raised and lowered by means of two 1¼-inch square thread steel screws, four threads to the inch. The machine must be belted from above, and a countershaft with our improved self-oiling brass-bushed loose pulley is furnished with each machine. The manufacturers furnish three speeds of feed with each machine. Floor space required 6x8 feet. Weight of machine 3 500 pounds. Countershaft has 12x6½-inch tight and loose pulleys, and should run 1,000 revolutions per minute. Address Frank & Co., Buffalo, N. Y.

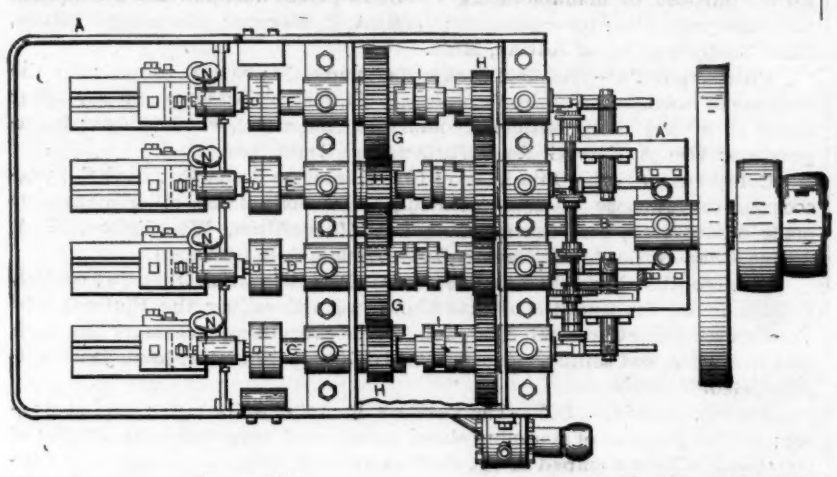


FIG. 2.—Plan.

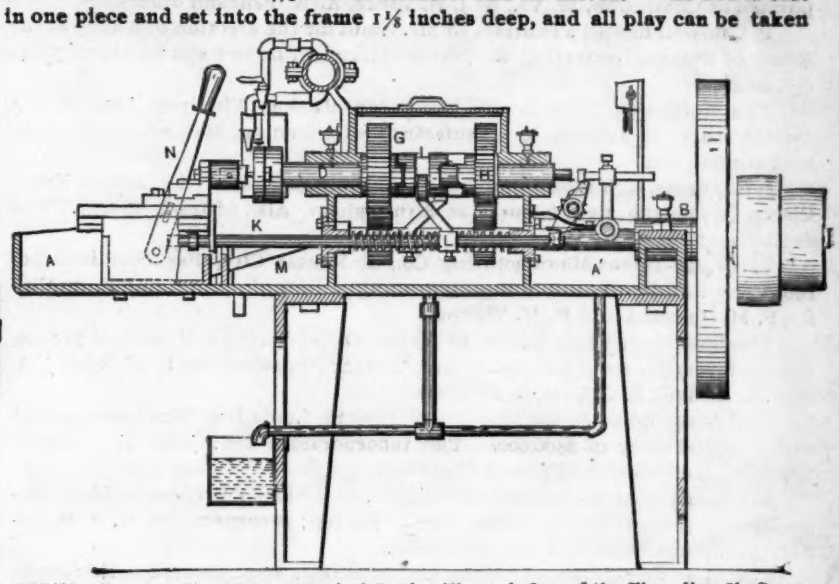
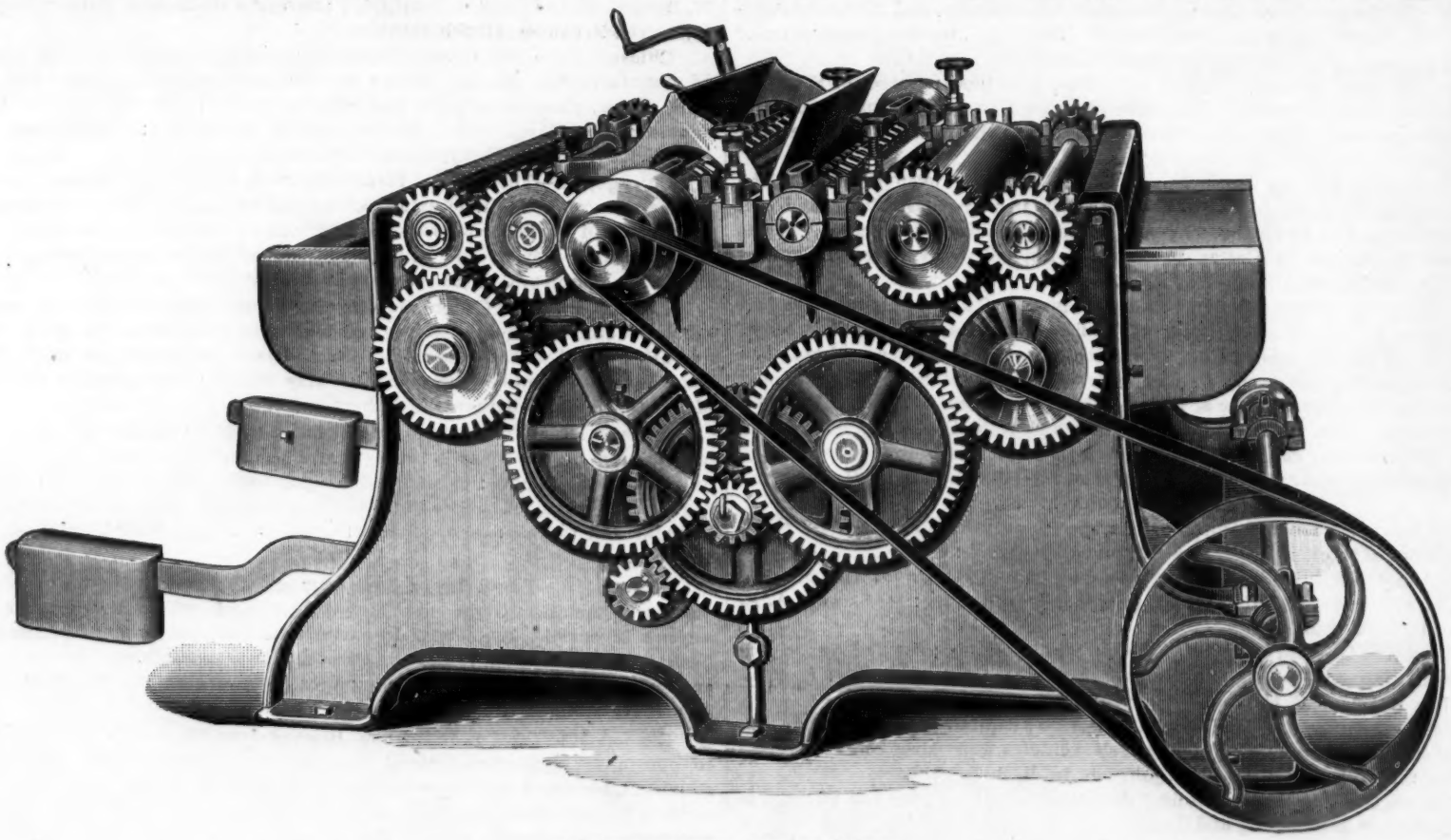


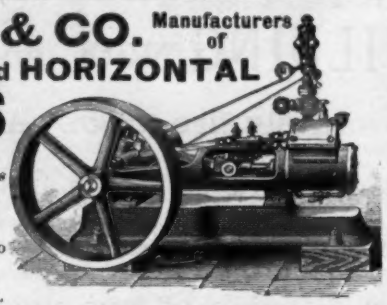
FIG. 3—Vertical Section Through One of the Threading Shafts.

MACHINE FOR THREADING BOLTS.—(See page 8.)



CABINET PLANER AND POLISHER.

THE JAMES LEFFEL & CO. Manufacturers of
IMPROVED UPRIGHT and HORIZONTAL
ENGINES & BOILERS
3 TO 26 HORSE POWER.
STRONGLY BUILT on BEST Principles for SMOOTH and ECONOMICAL WORK.
Over 4000 in Use.
Write for free PAMPHLET and state your wants to
THE JAMES LEFFEL & CO.
SPRINGFIELD, OHIO or NEW YORK CITY.



The Hackney Power Hammer

The Measure of Excellence and Profit.

The durability of the machine and the quantity—with quality—of work produced, is nowadays the measure of excellence and profit, and in this respect the "Hackney" is far in the lead.

It surpasses other power hammers in durability, speed and quality of work.

Write for catalogue and prices.

THE HACKNEY HAMMER CO.
Cleveland, O.

INDUSTRIAL SUMMARY.

New Enterprises:—

D. Knowlton, of Washington, D. C., will erect a new factory for the manufacture of wire beds.

The Holcomb Brown Iron Co. have been incorporated at Burlington, Ia., with a capital stock of $350,000.

A charter was granted last week to the Perfection Knitting Machine Co., of Clearfield, Pa. The capital stock is $18,000.

The Nail City Stamping Co., capital limited to $1,000,000, has been incorporated at Charleston, W. Va., by J. N. Vance, A. W. Paul and others.

P. Caldwell has let a contract to Mr. Stout for the erection of a shop at the House of Refuge, Louisville, Ky.; the building will be two stories high, 150x40 feet in size.

The Northwest Wire Co. is being organized at Winnipeg, Man., with a capital stock of $50,000, to manufacture wire fencing, barb wire, wire nails, wire staples, etc.

J. F. Adams, R. Randall and others have incorporated the Adams Track Clamp Co., for the manufacture, at Birmingham, Ala., of track clamps. The capital stock is $150,000.

The Luce-Talbot Manufacturing Co., of Kansas City, has been incorporated; capital, $300,000; incorporators: O. J. Luce, L. J. Talbot, F. W. Guffin, F. M. Hayward and R. M. Walton.

The Buel Manufacturing Co., of Akron, O., with a capital stock of $25,000, has filed a certificate of incorporation. The incorporators are E. M. Buel, J. A. Buel, C. T. Buel, P. C. Buel, B. F. Tracy.

The Acme Motor & Machine Co., of East St. Louis, has been incorporated with a capital stock of $500,000. The incorporators are: John F. Pollock, James M. Lohring and Charles A. Lohring.

The Atlas Electrical Manufacturing Co., at Chicago, propose to manufacture dynamos, motors, etc.; capital stock, $12,000; incorporators, M. F. Matteson, Q. A. Stephenson and J. B. Albertson.

The Ray Valve Manufacturing Co. have been incorporated at Elizabeth, N. J. The capital is $100,000, one-half of which is already paid in, and will be used in starting works in Linden County, N. Y.

R. W. Welch, W. A. Dunn, L. D. Passano and others have incorporated the Eclipse Manufacturing Co., at Baltimore, Md., to manufacture machines for cleaning grain, etc. The capital stock is $5,000.

John H. Parker, F. E. Knight, Chauncey J. Weatherby, and others, of Baltimore, Md., have incorporated the Parker & Knight Co., for the manufacture of machine tools, etc. The capital stock is $25,000.

J. F. Caldwell, George F. Miller and others have incorporated the Huntington (W. Va.) Heat & Ventilating Co., for the manufacture of furnaces and ventilating apparatus. The capital stock is $10,000, with privilege of increasing to $50,000.

The Toledo Rolling Stock Co., of Toledo, O., have been formed for the manufacture of railway rolling stock, and will also purchase, lease and sell same. The capital stock is placed at $1,000,000. Sheldon C. Reynolds, Charles L. Reynolds, Abram W. Cotter, Frederick J. Reynolds and Emery D. Potter, Jr., are identified with the new concern.

The Ironton Structural Steel Co. is the name of a concern that has just been organized, and whose articles will be filed with the Register of Deeds in a few days. Its business will be to smelt and work iron ores and roll and manufacture iron and steel. Its headquarters will be at New York City, and its principal Minnesota office at Duluth. The incorporators will be Rudolph T. McCabe and Wm. R. Heath, of New York, and Robt. C. Belville, of Trenton, N. J. The company contemplates building its works at Ironton, and using the York process of manufacturing structural steel.—[Duluth (Minn.) Herald.

NEW INCORPORATIONS.

The following recent incorporations, specially reported for *The Iron Trade Review*, are of interest to the iron and machinery trade:

Canton, O.—The Miller Steam Pump Co.; capital, $3,500; for the purpose of manufacturing and selling steam pumps; incorporators: W. Barnett, A. E. Hockwalt, C. M. Miller.

Cleveland, O.—The Oliver P. Clay Co.; capital, $10,000; for the purpose of manufacturing and selling engineering specialties; incorporators: Isaac C. Goff, Jno. R. Geary, F. H. Goff.

West Freeport, Ill.—The Johnson Wheel Co; capital, $75,000; for the purpose of manufacturing and selling wheels, vehicles and parts thereof; incorporators: T. N. Johnson, Sr., T. N. Johnson, Jr., R. B. Tewksbury.

Canton, O.—The Acme Roofing Co.; capital, $25,000; for the purpose of manufacturing, purchasing and dealing in steel and iron roofing, eave-troughs, conductors, etc.; incorporators: John G. Lorenz, Geo. J. Smith, Emil Fickinger.

East St. Louis, Ill.—The Venice Transportation Co.; capital, $10,000; to construct and own railroad equipment and lake vessels, and lease the same to railroads; incorporators: Chas. C. Pierce, Jr., Chas. E. McClure, John Fleming.

Freeport, Mich.—The Freeport Automatic Farm Gate Co.; capital, $5,000; for the purpose of manufacturing and selling a patented farm gate; incorporators. R. Wolcott, Carlton: Jas. D. Cool, Chas. A. Curtis, both of Freeport, Mich.

Greenfield, O.—The John M. Waddel Manufacturing Co; for the purpose of manufacturing cash registers and indicators, coffee mills, etc; incorporators: Jno. M. Waddel, E. L. McClain, S. L. DeVoss, W. A. Anderson, Henry L. Dickey.

Chicago, Ill.—The Chicago Safety Scaffolding Co.; capital, $10,000; for the purpose of manufacturing, building, selling and renting out scaffolds and scaffolding for all purposes; incorporators: Nathan C. Wheeler, Harry L. Irwin, Edward A. Irwin.

Adrian, Mich.—The Adrian Novelty & Manufacturing Co.; capital, $5,000; for the purpose of manufacturing the Snow patent dust-pan and attachment and other novelties; incorporators: Louis A. C. Wagoner, Channing Whitney, Chas. S. Whitney, all of Adrian, Mich.

Pittsburgh, Pa.—The Carlin Manufacturing Co; capital, $50,000; for the purpose of manufacturing iron castings, steel, lead or brass, or of any other metal or of any other article of commerce from metal, wood or both; incorporators: Wm. A. Kerr, G. Ross Williams and Grant Swartz.

Columbus, O.—The Ohio Lawson Non-Explosive Boiler Co.; capital, $300,000; for the purpose of manufacturing steam boilers and other machinery made out of iron, etc.; incorporators: A. H. McAlpin, Wm. Felton, H. A. Axline, Chas. G. Lord, J. C. Taylor, D. T. Lawson, S. B. Campbell.

Chicago, Ill.—The Finfrock-Veesemeyer Patent Journal Oiler Co; capital, $1,000,000; for the purpose of manufacturing and selling the Finfrock and Veesemeyer patent journal oiler, and to do everything necessary for such manufacturing and selling; incorporators: George Finfrock, John Jacob Altpeter, Geo. Veesemeyer.

Marion, Grant Co., Ind.—The Peerless Stamping & Glass Co.; capital, $20,000; for the purpose of stamping sheet metals and manufacturing articles of merchandise from stamped or cut sheet metal with other finishings, and dealing in such articles or materials, etc.; incorporators: Wm. Feighner, Jno. H. Forrest, Walter Stephenson.

New York City, N. Y.—The Barnett Manufacturing Co.; capital, $5,000; for the purpose of manufacturing and selling packing for machines, steam engines, and to manufacture machines for such packing; incorporators: Henry W. Barnett, Grand Central Hotel, N. Y.; Sterling Wallace, 39 Nassau street, N. Y.; Alfred Fornander, 819 6th avenue, N. Y.

Chicago, Ill.—The DuLaney Clock Co.; capital, $300,000; for the purpose of manufacturing, selling, leasing and dealing in electrical clocks and other time pieces, clock ornaments and other art goods; electrical appliances and apparatus, time registering devices, motors and meters; incorporators: Jas. W. DuLaney, Chas. S. Perry, Chas. F. DuLaney.

Chicago, Ill.—The Chicago Hydraulic Press & Mill Co.; capital, $300,000; for the purpose of manufacturing, selling and dealing in mill for crushing and grinding, and hydraulic presses and all kinds of machinery connected therewith and that may or can be used in connection therewith; incorporators: Cornelius Kimplen, C. B. Shove, Carl D. Bradley.

Chicago, Ill.—The Columbia Wire Co.; capital, $500,000; for the purpose of manufacturing, buying, selling and dealing in all kinds of iron, steel, barbed and other metal wires; to own and deal in letters patent and patent rights, in the United States and as the company may decide; incorporators, Frank H. McCuloch, Edward Bornemann, Albert M. Cross.

Chicago, Ill.—The Colorado Copper Co.; capital, $3,000,000; for the purpose of acquiring by purchase or other lawful way, mines and mining property of gold, silver and copper; to hold and develop such mining property; to mine, reduce, smelt and deal in ores, and to do and transact all such business as may be incidental thereto; incorporators: Chas. W. Griggs, Wm. J. Sheahan, H. C. Fancher.

Chicago, Ill.—The Railway Improvement Co; capital, $10,000,000; for the purpose of manufacturing and selling rails, ties and other railway supplies; to acquire inventions, materials, property, real and personal, as necessary in business of said company, and license others to manufacture under patents for any inventions acquired by said company; incorporators: Arthur J. Hartford, Homer N. Hibbard, Albert G. Wheeler.

Elwood, Madison Co., Ind.—The Elwood Iron Works; capital, $10,000; to conduct and engage in a general manufacturing business, and especially to construct, own and operate a foundry and machine works, and to sell such articles as said company shall manufacture, and to do any and all things necessary or proper to further the interest of said establishment; incorporators: John Holloran, James B. Baird, Joseph W. Littler.

Additions, Enlargements, Removals, Etc.:—

D. H. McCarthy contemplates removing his model and machine factory from Kansas City, Mo., to Milwaukee, Wis., providing a suitable location can

ROLLS. EST'B. AND 1863. PINIONS.
THE TOTTEN & HOGG IRON & STEEL FOUNDRY CO.
OFFICE & WORKS
24TH ST. & A.V.R.R.
PITTSBURGH, PA.
CHILLED & SAND ROLLS
ROCK CRUSHERS,
SHEARS SQUEEZERS AND ROLLING MILL MACHINERY.

be secured. The principal work of the shop is to make models of a fine construction.

The Sucker State Drill Co., of Belleville, Ill., will double their capacity.

The Haugh-Ketcham Co. is building a new $8,000 foundry, at Indianapolis, Ind.

The Flenniken Turbine Co., of Dubuque, Ia., propose to enlarge their plant.

The Wright Machine Co., at Worcester, Mass, are building an additional machine shop 100x42 feet in size.

About $14,000 worth of new machinery is to be placed in the Sun Foundry & Machine Shops, at Provo, Utah.

Brightman & Collins, Cleveland, will erect a machine shop, to be 58x103 feet, two stories, and built of brick.

It is reported that the Steam Heater Co., of Susquehanna, Pa, will erect a new and larger machine shop next season.

Plans have been prepared for a foundry for O. Rourke & Co, of Peoria, Ill., to be 40x120 feet, built of brick and frame.

Two additions, 100x30 and 100x40, respectively, will be built to the works of the Jenkins Machine Co., at Sheboygan, Wis.

The Lufkin Rule Co. will remove from Cleveland, O., to Saginaw, Mich., January 5th, 1892, where they will occupy new and commodious shops.

Arrangements have been made with the Phœnix Lock Co., of Newark, N. J., for the removal to Martinsburg, W. Va., of the builders' hardware factory.

The removal of the foundry department of the Canton Pump Works to Akron, O., says the *Beacon*, is a certainty. The deal is closed and 3½ acres adjoining the Brigger Belting Co. is the land selected for the new concern. It is the design of the company to commence the erection of buildings immediately and have them completed in 90 days. The main foundry shop will be 50x150 feet in size and one story high. Pattern shops and engine-room and other additions are in the plans. The company will, at the start, put to work a force of 75 men. It is expected to increase this from time to time.

Fires and Accidents:—

The Locke Machine Works, at Bradford, Pa., have been burned at a loss of $10,000.

Haberman's tin factory, at Laurel Hill, L. I., N. Y., has been destroyed by fire, at a loss of $75,000.

A machine shop used by the Baltimore & Ohio Railroad, at Fifty ninth street and Woodland avenue, Philadelphia, has been burned, at a loss of $10,000.

A portion of the St. John Nut & Bolt Works, St. John, N. B., was recently destroyed by fire. The works were fitted with the best machinery to be procured. The loss is heavy.

General Industrial Notes:—

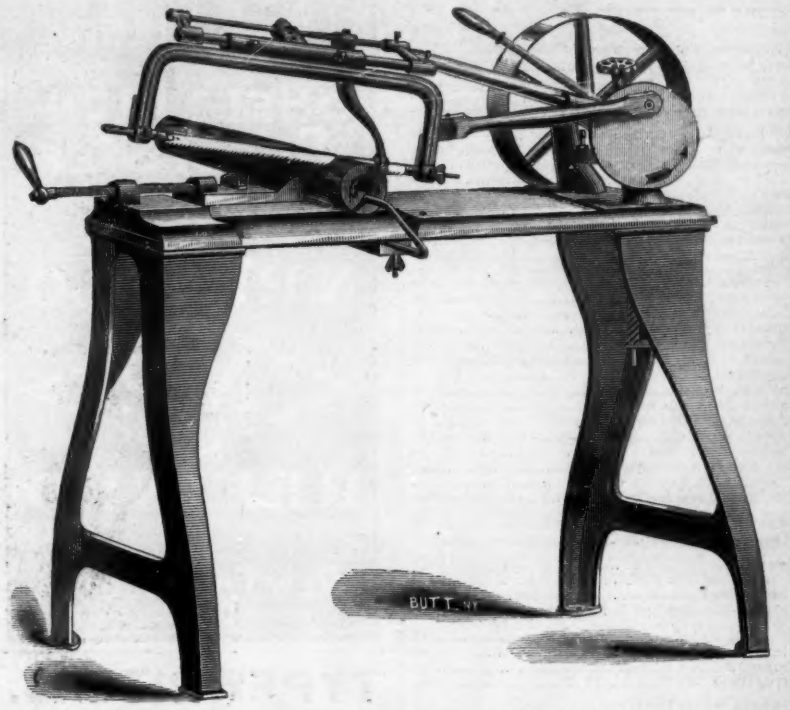
Any one wishing any second-hand engines or other kinds of machinery, can find a good opportunity of obtaining same by addressing Klein & Cohen, No. 479-481 Plum street, Cincinnati, O., who have quite a quantity on hand, and competent workmen to put the same in first class working order.

The Bostwick Steel Lath Co., at Niles, O, is developing into quite an industry. They have just finished a large order for lath for San Francisco parties and are now shipping 25,000 square yards to a Chicago contractor for one house. Recently they received an order for 7,100 square yards for the Grand Opera House being built in the city of Mexico.

The Jeffrey Manufacturing Co., who are known largely throughout the country as manufacturers of malleable and steel roller chains, Hey-Oborn and special chains, have added a line of link belting, made from their own patterns, which will insure uniform pitch. These are made to work on standard sprockets wheels and are interchangeable with other makes of corresponding numbers. This company has the largest line of chains to select from in the world and it would be to the interest of all users of chain to have their reduced price-list which can be had by addressing the company at Columbus, Chicago or New York.

THE STAR POWER SAW.

This machine is designed for cutting iron and steel. It will cut any size up to 4½ inches in diameter, and any shape that can be held in the vise. It also cuts piping very nicely. The makers do not claim great speed in cutting, but metal can be cut much more rapidly in this machine than can be done in a lathe or planer, or by heating and cutting with a "blacksmith's hack," and at a trivial cost. By its use a good percentage of metal is saved, as the pieces cut are left smooth and no labor or metal is lost in squaring up, as is the case after heating and cutting with the "hack." This saving in Hobson's, Jessop's or other high cost steels is quite an item in stock, to say nothing of labor. For cutting up die blocks and a thousand and one other things, the advantage of using this saw will be manifest. The blades used for cutting are the Star hack saws, 10, 11 and 12 inches in length. The only expense is the comparatively slight wear of these blades, and the little time taken in securing the stock to be cut in the vise to the machine and setting the latter in motion. No attention is required until the piece is cut off. The expense of blades is small, as one blade will cut off a steel shaft 4½ inches in diameter several times. The machine should be run from 45 to 50 revolutions per minute. It



is certainly a valuable labor saving tool for the blacksmith shop, the tool or machine room, as it can be put to many uses not at once suggested to the mind. Manufactured by Millers Falls Co; factory, Millers Falls, Franklin Co., Mass; warerooms 93 Reade street, New York.

THE STIRLING COMPANY

MANUFACTURE

The Safest, Most Economical, Compact and Durable High Pressure

WATER TUBE BOILERS

All Wrought Steel. Large Mud Drum. Perfect Circulation.

By removing four manhole covers access is gained to every part of the boiler. Dry steam and great economy of fuel guaranteed.

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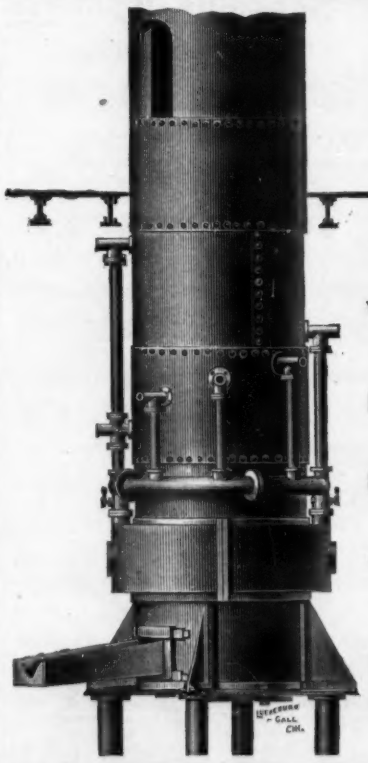

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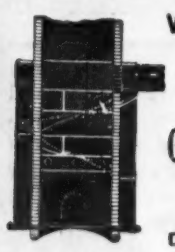

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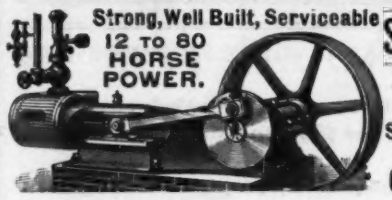

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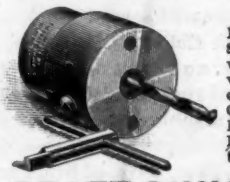

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ST. LOUIS (reported by Rogers, Brown & Meacham): HOT BLAST COKE AND CHARCOAL—Southern Coke No. 1, $15 50@15 75; Southern Coke No. 2, $14 50@14 75; Southern Coke No. 3, $13 75@14 25; Southern Grey Forge, $13 25@ 13 50; Southern Charcoal No. 1, $17 25@17 75; Southern Charcoal No. 2, $16 75@1 25; Missouri Charcoal No. 1, $15 50@16 00; Missouri Charcoal No. 2, $15 00@15 50; Ohio Softeners, $18 00@ 19 00. CAR WHEEL AND MALLEABLE IRONS—Lake Superior, $19 50@20 00; Southern, $19 50@ 20 00. CONNELLSVILLE COKE—East St. Louis, $0 00; St. Louis, $5 65.

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LOUISVILLE (reported by Geo. H. Hull & Co.): Southern Coke No. 1 Foundry $14 50@ 15 00; Southern Coke No. 2 Foundry $13 50@ 14 00; Southern Coke No. 3 Foundry $13 00@ 13 50; Grey Forge, $12 50@12 75; Southern Coke Silver Grey, $00 00@00 00; Southern Charcoal No. 1 Foundry, $16 00@17 00; Car Wheel, $18 00@20 00.

PITTSBURGH (reported by A. H. Childs): No. 1 Foundry, $15 50@16 00; No. 2 Foundry, $14 50@15 00; Grey Forge, $13 50@13 75; White and Mottled, $13 00@13 25; Warm Blast Charcoal, $18 00@22 00; Cold Blast Charcoal, $22 00 @26 00; Bessemer, $15 25@15 75.

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1½ to 4 by ⅛ to 1 inch	1 70
4½ to 6 by ⅛ to 1 inch	1 55
1½ to 6 by 1⅛ to 2 inch	2 15
1¼ & 1⅛ by ¼ to ½ inch	1 85
1 & 1¼ by ¼ to ½ inch	1 95
⅛, ½ and ⅝ by ⅛ to ⅝ inch	2 15

Round and Square.

1 to 1⅞ inch	1 75
2 to 2½ inch	1 95
2¼ to 2¾ inch	2 25
2¾ to 4 inch	2 75
4¼ to 4½ inch	3 25
4¾ to 5 inch	3 45

Ova

¼ to 1¼ inch	2 15
⅛ to ½ inch	2 25
⅝	2 55
¾	2 95

Half Oval and Half Round.

⅜ to 3 inch	2 85
⅜ to 1¼ inch	2 45
⅜ to ½ inch	2 05
⅝	2 25
¾	4 75

Heavy Band.

½ to 6 by ¼ and 5-16 inch	1 55
½ to 1½ by ¼ and 5-16 inch	2 05
½ to ¾ by ¼ and 5-16 inch	2 25
½ to 6 by ½ and 5-16 inch	3 75

Hoops.

1¼ to 4, Nos. 13 to 15	2 55
1¼ to 2, Nos. 16 to 18	2 65
1¼ to 2, No. 19	2 75
1¼ to 2, No. 20	2 85
1¼ to 2, No. 21	2 95
1¼ to 2, No. 22	3 05
15-16, 1 and 1⅛, Nos. 13 to 15	2 75
15-16, 1 and 1⅛, Nos. 16 to 18	2 85
15-16, 1 and 1⅛, Nos. 19 and 20	2 95
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⅞, Nos. 13 to 15	2 95
⅞, Nos. 16 to 18	3 05
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13-16, Nos. 13 to 15	3 15
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13-16, Nos. 19 and 20	3 35
13-16, No. 21	3 45
13-16, No. 22	3 55
¾, Nos. 13 to 15	3 25
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11-16, Nos. 19 and 20	3 75
11-16, No. 21	3 85
11-16, No. 22	3 95
⅝, Nos. 13 to 15	3 75
⅝, Nos. 16 to 18	3 95
⅝, Nos. 19 and 20	4 05
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1¾ to 6 by ⅛ to 3-16 in	2 20
1¾ to 6 by Nos. 11 and 13	2 30
1 to 1¾ by ⅛ to 3-16 in	2 40
1 to 1¾ by Nos. 11 and 13	2 50
⅞ and 13-16 by ⅛ to 3-16 in	2 70
⅞ and 1 3-16 by Nos. 11 and 13	2 80
¾ and 11-16 by ⅛ to 3-16 in	3 00
¾ and 11-16 by Nos. 11 and 13	3 10
⅝ and 9-16 by ⅛ to 3-16 in.	3 30
⅝ and 9-16 by Nos. 11 and 13	3 40
½ by ⅛ to 3-16 in	3 60
½ by Nos. 11 and 13	3 70

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¾ inch, " " " 13 and 14	3 00
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No. 15 to 17	2 55
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No. 22 to 24	2 85
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No. 27	3 25
No. 28	3 50

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C No. 1, " "	2 40
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Tank iron	12 50
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Wrights.....₩ lb 12

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Moulders'.....dis 40@40&10
Hand.....dis 40&10@50

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Boston Belting Co's standard.....dis 70
" " " extra.....dis 60&5
" " " best.....dis 55
Hoyt's Short Lap.....dis 45
Cleveland Rubber Co. extra standard..dis 60&10
Shults Raw Hide Leather Belting, single, ...dis 40
Shults Raw Hide Leather Belting, double, and Light Double.....dis 40
Standard, oak tanned.....dis 50&10
Alexander Brothers' pure oak tanned. ...dis 45

Blowers and Exhausters.

B. F. Sturtevant's.....dis 20
Boston Blower Co.,.....dis 35
Buffalo.....dis 35

Borax.

.....₩ lb 12

Chalk.

White .....₩ gross 50
White Crayon.....₩ gross 12@12½ dis 10
Red.....dis 70
Blue.....dis 85

Chucks.

Cushman's 4 Jaw Independent.....dis 45
" Combination.....dis 40
" Geared Scroll.....dis 30
" 2 Jaw Brass Workers.....dis 30
" Drill.....dis 35
Wescott's Scroll Combination.....dis 33⅓
" Independent.....dis 40
" Little Giant Drill.....dis 30
Horton's Universal.....dis 40
" Independent.....dis 45
Whiton's Independent.....dis 45
National Combination.....dis 40
Sweetland " .....dis 40
Almond Drill.....dis 20
Morse " .....dis 15
Skinner's Combination Lathe.....dis 33⅓
" Independent Lathe.....dis 40
" Universal Lathe.....dis 40
" Drill.....dis 15

Cutters and Reamers.

Cleveland.....dis 10@15
Pratt & Whitney.....dis 10@15
Standard.....dis 10@15
Brown & Sharpe, Milling Cutters.....dis 15
Gear Cutters.....dis 15

Crowbars.

Cast Steel.....₩ lb 4
Iron, steel points.....₩ lb 3½

Drill and Drill Sockets.

Twist drills.....dis 50&10
Morse Taper and Straight shank to 1⅝".....dis 50&10
Morse Taper and Straight shank Larger than 1⅝".....dis 25
Drill Sockets.....dis 25
Standard Twist Drills.....dis 55@55&5
Cleveland " " .....dis 55@55&5

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	No. 4 to 46 gr.	No. 54 to 150. gr.	Flour, F.	C. F. FF.
Kegs, ₩ lb	4 c	5 c		2½c
½ kegs ₩ lb	4½c	5½c		2¾c
¼ kegs ₩ lb	4¾c	5¾c		3 c
1 lb cans, 10 in case	6 c	6½c		5 c
1 lb cans, less than 1	10 c	10 c		7½c

Emery Cloth and Paper.

Barder, Adamson & Co.....dis 45@50
H. H. Barton.....dis 50@50&10

Emery Wheels.

Detroit.....dis 55@60
Norton's.....dis 55@60
Grant.....dis 55@60
Sterling.....dis 60
Celluloid.....dis 10&33⅓
Northampton.....dis 55
Crystal.....dis 65@70
Vitrified.....dis 60
Vulcanite.....dis 10&10

Files.

Nicholson.....dis 60&10@60&10&10
" X. F.....dis 25
Kearney & Foot.....dis 60&10@60&10&10
Black Diamond.....dis 60&10@60&10&10
Arcade.....dis 60&10@60&10&10
Disston's.....dis 65@70
Western.....dis 70
Stub's.....dis 25
Grobet's.....dis 50
Reynolds Bros.' Hand Cut.....dis 50
Industry File Works, hand cut.....dis 50

Hammers.

P. S. W.....dis 40
Atha new list, Jan. 15, 1887.....dis 50
Heavy hammers and sledges under 5 lbs. 18c over 5 lbs 14c, new list.

Jack Screws.

Illinois Bolt Co. list.....dis 70

Nuts and Washers.

Size of bolt inches	⅜	5-16	½	⅝	¾	⅞	1
Square	8	7	5½	4½	4	3½	2½
Hexagon	15½	11½	8½	6	5½	5¼	5
Washers	9	8	7	5	4½	4½	4½

In lots less than 100 lbs. ₩ lb add ¼c., lb boxes add 1c to list.

Nails (wire.

List July 14, 1887.....dis 70 &10
Standard Penny Nails, ₩ keg card rate { Car lots.....$2.30 / Less than car lots $2.40

Oilers.

Zinc and Tin.....dis 60
Brass and Copper.....dis 50
Malleable (Hammer's), No. 1, $3.60; No. 2, $4.00; No. 3, $4.40 ₩ doz.....dis 10@10&10

Packing, Steam.

Boston Belting Co.....dis 60
American Packing Hemp.....₩ lb 10@11
Russia Packing " .....₩ lb 14
Italian Packing " .....₩ lb 13@14
Plumbago Piston.....₩ lb 40
Morrison's " .....₩ lb 50
Square Flax " .....₩ lb 50
Sheet Rubber.....₩ lb 12&24
Excelsior Rubber.....₩ lb 48

Picks.

Railroads, 5 to 6 lbs.....$12 dis 60
" 6 to 7 lbs.....$13 dis 60

Pulleys.

Iron Pulleys, Walker List.....dis 45
Medart Pulleys.....dis 55
Split Wood Pulleys.....dis 50@55

Rivets.

Iron, Thousand, list November 17, ...dis 50
Iron, Ordinary, Cooper's Block and Carriage list November 17.....dis 50
Copper.....dis 50@50&10

Rope.

Manilla, ½ inch and over.....₩ lb 13½
Sisal, ½ inch and over .....₩ lb 13½

Sand Paper.

B. A. & Co.....dis 45@50
H. H. Barton's.....dis 40@45
New England Flint.....dis 40@50
Barton's Garnet.....dis 20

Saws.

Disston's Circular.....dis 40@10
" Band.....dis 20
" Scroll .....Net
Hack Saw Stubs.....dis 20
" " Eureka.....dis 20
" " Star.....dis 20
Saw Swages Disston's.....dis 30
Atkins' Circular Saws.....dis 40&45
" Mill, Mulay and Drag Saws..dis 40&10
" Wood Saws.....dis 40&10
" Silver Steel Diamond Cross-cut Saws.....dis 70c per ft
" Dexter Cross-cuts.....dis 50c "
" Diamond " .....dis 30c "
" Tuttle Tooth Cross-cuts..dis 25c "
" One-man Cross-cuts.....dis 33c "
No. 1 Handles.....dis 25c per pair
No. 6 " .....dis 16c "
Excelsior Saw Tools.....$6 per doz
Perfection " .....$15 "
Detroit Saw Works, Circular.....dis 50
" " " Band.....dis 25
" " " Mulay .....dis 45

Screws.

Wood Screws—New List 1890.

Flat head iron.....dis 72½
Round head iron.....dis 67½
Flat head brass.....dis 72½
Round head brass.....dis 65
Square Cap.....dis 65
Hexagon Cap.....dis 40
Set C. H. C. P.....dis 70
Machine, flat head, iron.....dis 65
Machine, round head, iron.....dis 60
Bench and hand—
Lag or coach.....dis 75@75&10
Coach, patent gimlet point.....dis 75

Shovels and Spades.

Ames' list November 1, 1885.....dis 20
Dennis.....dis 5.25
Hussey & Binns railroad.....dis 8.00

Taps.

Cards, Hand and Nut to 2 in.....dis 50
Carpenters' " " " .....dis 50
Morse " " " .....dis 50
Pratt & Whitney " " new list dis 10
Machine Screw Taps.....dis 55
Pipe Taps to 2½ in.....dis 70
Stay Bolt Taps.....dis 25
Stove Bolt Taps.....dis 50
Pulley Taps.....dis 40

Twine.

	BC.	B.
No. 12, Flax Twine, ¼ and ⅜ lb Balls	21c@29c	
No. 18 " " ¼ and ⅜ "	18c@28c	
No. 36 " " ¼ and ⅜ "	16c@27c	
2-Ply Hemp, ¼ & ⅜ lb Balls (Spring Twine 1½c		
3-Ply " 1 lb Balls	12@12½c	
3-Ply " 1½ lb Balls	11@11½c	
Cotton Wrapping, 5 Balls to lb	15@16c	

Vises.

Solid Box.....dis 60
Parker's.....dis 20@25
Prentiss.....dis 20
Stephen's.....dis 25@30
Barrett's.....dis 30
Miller's Falls.....dis 40
Merrill's.....dis 15@20
Howard.....dis 35

Wire.

New List, Jan. 18, 1884

Brass and copper.....dis 20@25
Bright and annealed, Nos. 0@18...dis 70&10@75
" Nos. 19@26..dis 75@75& 5
" Nos. 27@36..dis 75&10& 5
Coppered Nos. 0 to 18, market list..dis 70@70& 5
Galvanized Nos. 0 to 18 " " .....dis 65&5
Tinned market Nos. 0 to 18.....dis 67½
Cast steel.....dis 50
Tinned Broom Wire.....dis 70&5@70&10
Annealed Fence, Nos. 8 and 9.....dis 75
Annealed Grape, Nos. 10 to 14.....dis 75
Stub's Steel Wire, regular.....$6.00@lb dis 5

Wrenches.

Coe's genuine,.....dis 50
Girard Standard.....dis 70&10
Agricultural.....dis 75&10
Mechanics'.....dis 55&10,& 5
Bemis & Call's Combination .....dis 35
Donohue's Engineers.....dis 20&10
Lamson & Sessions Engineers.....dis 60
Billings & Spencer's Drop Forged.....dis 25
William's " " .....dis 25
Alligator " " .....dis

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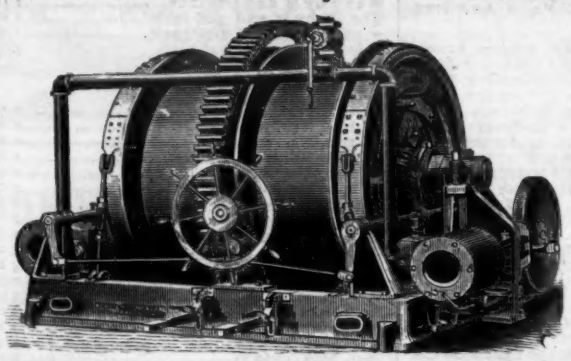

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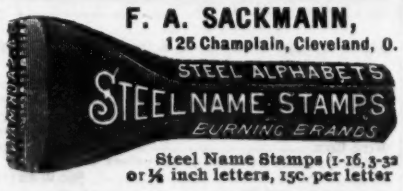

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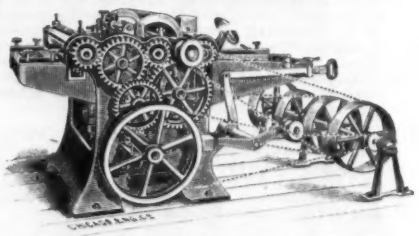

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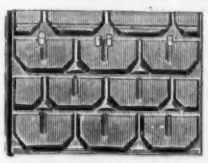

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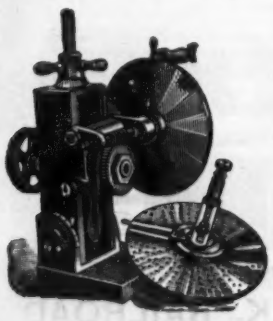

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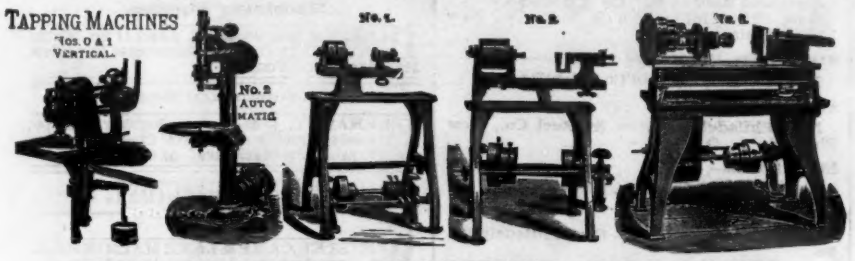

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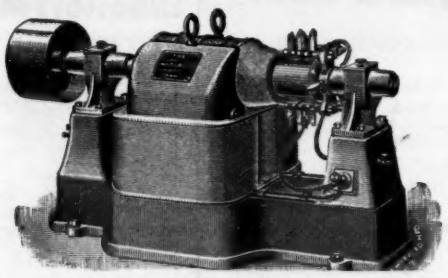

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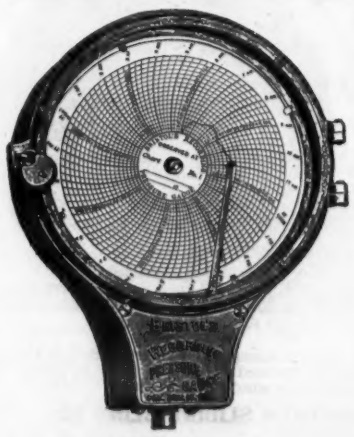

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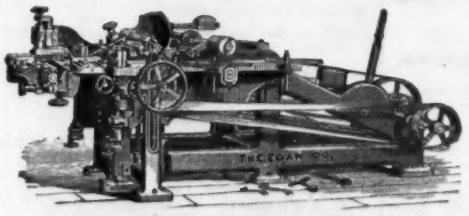

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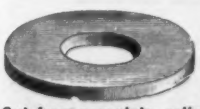

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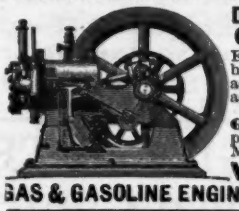

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Youngstown Local.....	†8 05 a m	
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Kent—6:50 a. m., 3:00 p. m., *5:45 p. m. 6:20 p. m.
Bedford—6:50 a. m., 11:10 a. m., 1:30 p. m., 3:00 p. m., 4:40 p. m., *5:45 p. m., 6:20 p. m. 10:35 p. m.
Newburgh—6:15 a. m., 6:50 a. m., 11:10 a. m., 1.30 p. m., 3:00 p. m., 4:40 p. m., *5:45 p. m., 6:20 p. m., 10:35 p. m.

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Zanesville and Coshocton—10:30 a. m., 6:30 p m.
Canton, 10:30 a. m., 2:35 p. m., 6:30 p. m.
Kent—*8:10 a. m., 10:30 a. m., 2:35 p. m., 6:30 p.m.
Bedford—6:00 a. m., *8:10 a.m., 10:30 a.m., 1:05 p. m., 2:35 p. m., 4:15 p. m., 6:30 p.m., 7:10 p.m.
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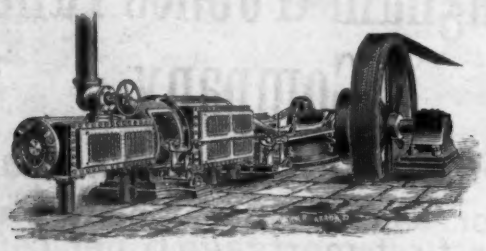

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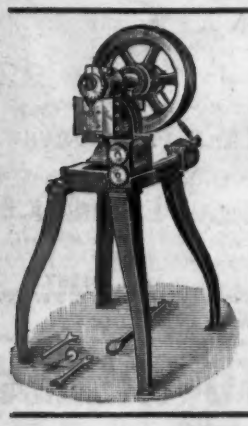

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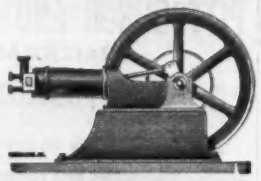

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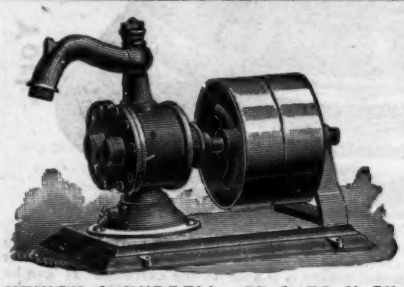

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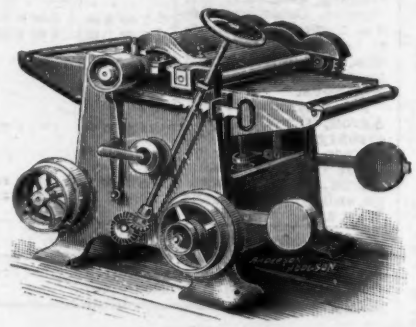

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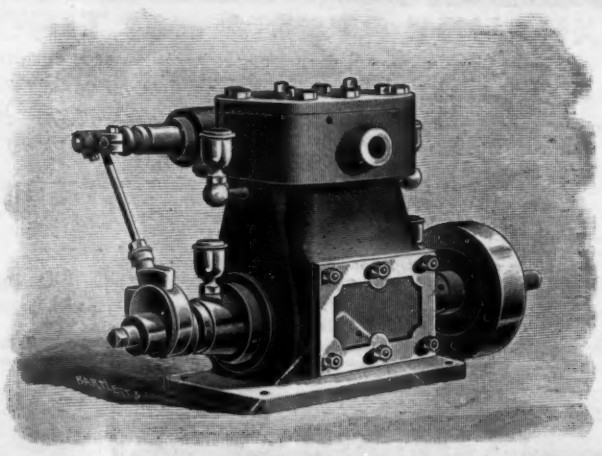

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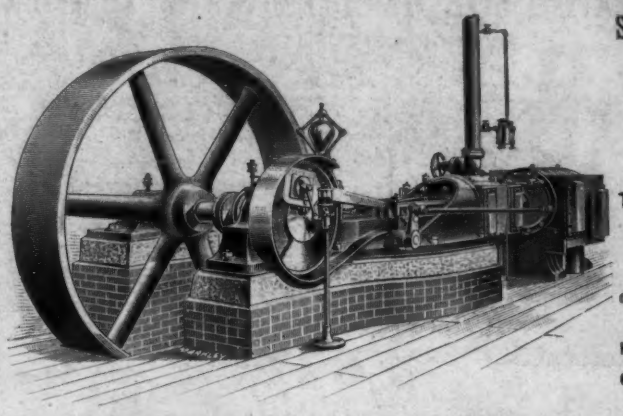

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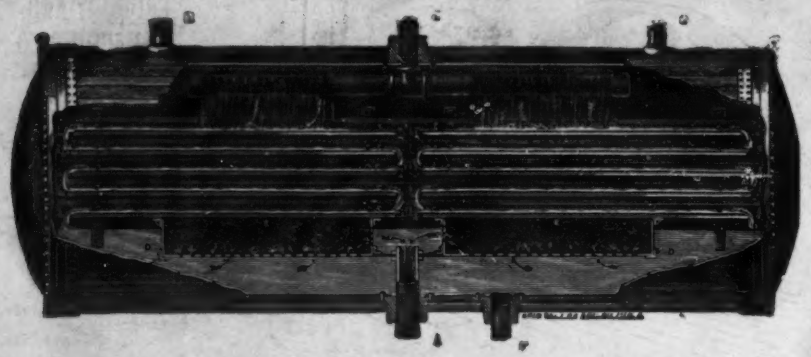

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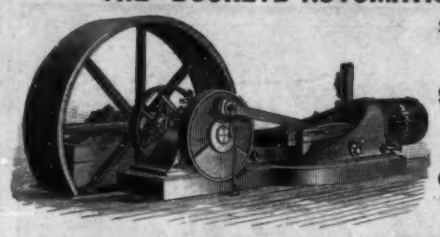

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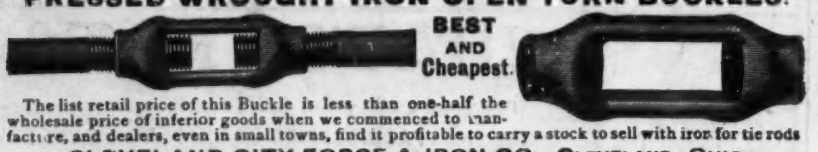

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